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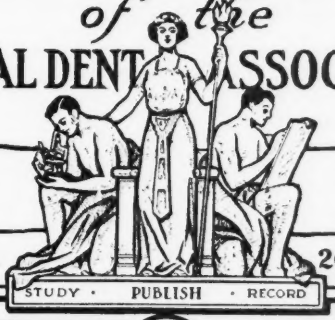

MAY, 1920

H. E. Friesell, B. S., D. D. S.—*Frontispiece.*

Occlusion as Applied to Crown and Bridge-work.—*Monson.*

The Anatomy and Physics of the Temporomandibular Joint.—*Wilson.*

The Problem of Retention.—*Hawley.*

What Constitutes Good Vulcanizing.—*Snow.*

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The Principles of Bacterin Treatment.—*McConnell.*

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H. E. FRIESELL, B.S., D.D.S., President-Elect.

THE JOURNAL
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Original Communications.

OCCLUSION AS APPLIED TO CROWN AND BRIDGE-WORK.

By George S. Monson, D. M. D., St. Paul, Minn.

(Read before the National Dental Association at Its Twenty-third Annual Session, New Orleans, La., October 20-24, 1919.)

THE subject is presented for the purpose of drawing special attention to the various phases of occlusion of the teeth.

First: The developing jaws.

Second: The bones adjacent to the maxillary bones forming the masticating organs of man.

Third: The segments or teeth mounted in this mechanism, forming the masticating members.

Fourth: The normal construction of the human jaw.

Fifth: Anatomical malformations of the mandibular mechanism.

Sixth: The construction of crowns and bridge-work in such a manner as to allow freedom of the range of occlusion, producing harmonious action and permanent health of the units.

Explanation of Terms.

In referring to "occlusion" and "Range of occlusion" I have reference to teeth in full occlusion and to teeth in contact in any position they may take in the act of mastication.

"Articulation" and "range of articulation" has reference to the temporo-maxillary articulation; while the word "Range" has reference to any position the mandible may take within the limits of the ligaments of this joint.

Dimensions of the Human Jaw.

The question arises what are the normal dimensions of the human jaw: We may accept as a general proposition that the normal jaw is one which has a geometrical balance in proportions.

In Dr. Bonwill's work on occlusion he has given to us the first scientific dimensions of which we make practical use in the development of this theory,—that of the equilateral triangle of four inches from condyle to condyle and from condyle to mesio incisal angle of the lower central incisors.

Triangle Not Always Equilateral.

This triangle *is not* always equal in its dimensions. It is sometimes an isosceles with two sides from condyle to incisal medium line equal. The short side is from condyle to condyle and in some specimens the angles are those of an acute triangle.

Geometric Basis of Calculation.

I wish at this time to add another geometric basis of calculation which I have found may be depended upon in determining the occlusal surfaces of the teeth in relation to the condyle movements.

The basis of this figure is a sphere whose radius is approximately four inches. The center is equi-distant from the occlusial surface of the teeth and the center of the condyle has the same radial dimensions.

The occluding surface of every tooth in the normal jaw will be found to be tangent to the radial line of the long axis of each tooth.

In the mandible where the teeth and condyles conform to the equilateral triangle or approaches these measurements, the "best" lines of force can be applied to the teeth in occlusion. That is, the long axis of the lower teeth more nearly approach the long axis of the upper teeth thus making a direct strain on the line of the teeth of upper and lower jaw.

In the case where the isosceles triangle dimensions are found, we also find an insufficient bony development of the mandible to accommodate the tooth or segments of the dental arch. This is evidenced by the short base line from condyle to condyle.

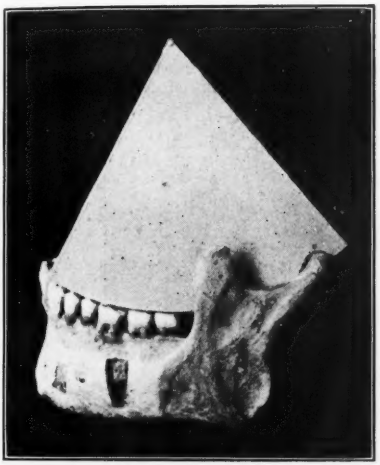
In these cases the individual has not developed the type of the parent dimensions. This is true as the enamel cap was developed at a time when function did not play a great part in developing its size. Hence the bony structure has not developed to accommodate the teeth or segments. In such cases we find the anterior teeth in the lower jaw not conforming to a radial line of the sphere, but taking a position as best they can in the bony structure developed.

In the individual where the acute triangle is developed we would find, if we could arrive at the complete history of the case, that during the development of the mandible, there was some interference with the normal masticating movements, due either to the loss of teeth or some discomfort on one side or the other.

If the function of mastication is normal during the period of development, there is a greater possibility of the triangle being equal in its dimensions, but in the majority of cases such perfect dimensions are not found.

For the purpose of study it will be necessary to obtain as perfect a skull as possible; one having a complete set of natural teeth. I advise a subject that has lived to the age of thirty or thirty-five years, as one of this age would be more likely to have facets worn on all the teeth denoting full function of mastication. An individual having lost teeth on one side of the mandible would naturally have an excessive function on the opposite side and in this manner, both muscular and osseous structure excessively developed throwing the mandible to one side.

Figure 1.



Illustrating the application of the circle to the line of occlusion and the intersection of the same radius by the condyle.

Figure 2.

The application of the circle obliquely across the mandible

In the study of the movements of the mandible let us confine ourselves to the occlusion and variation as the occluding surfaces offer us the best structures from which to take direction and measurements.

Examining as nearly a perfect set of teeth in the mandible as obtainable, Figures 1, 2 and 3, we will note they

Figure 3.

The same circle applied to the molars, showing the occlusion of the molars conforming to the circle.

conform to a circle with a radius of four inches, from cuspid to condyle, the line passing thru the center of the condyle. We further note that a similar circle will pass from the same cuspid thru the center of the opposite condyle. The circumference of the same circle when placed obliquely across the molars and bi-cuspids will conform to the occlusion of the teeth.

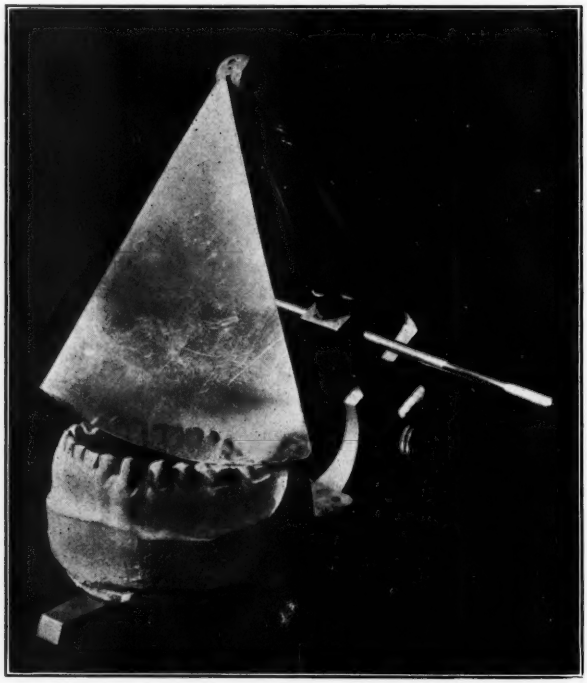
This may be demonstrated by an eight inch sphere used on the mandible to conclusively prove this basic principle, as

illustrated in the first three illustrations. Its practical application is shown in Figures 4 and 5.

FIRST—THE DEVELOPING JAWS.

Having stated this mechanical basis, let us take up the first phase of our discussion, "The Developing Jaws."

Figure 4.



Practical application of the principle to models.

During early life we find the triangle narrower at the base, between the condyles, the superior maxillary bone having the same corresponding relation. The base of the cranium has corresponding dimensions and in full function the triangle develops toward an equilateral triangle.

BEAUTY HAS A MATHEMATICAL BASIS.

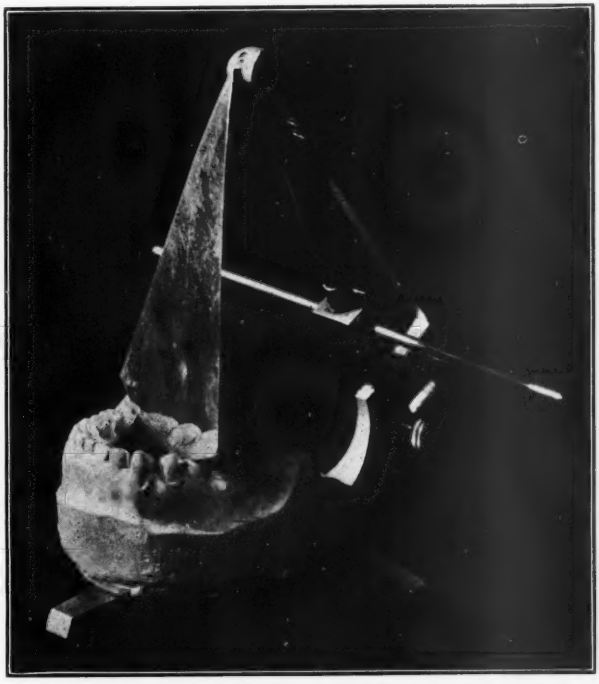
Function develops well-balanced geometric proportions. Thus we see all beauty has a mathematical basis. From childhood, the function of mastication is an essential factor in developing the normal jaws and the base of the cranium as well. If for any reason this function is impaired we find a lateral development, both in cranium and mandible.

This leads to the necessity in early life of correction of improper function, due to loss of teeth, improper food and habits.

If these are not corrected and the child put to proper function of this organ of digestion, we find insufficient bony structure to accommodate the permanent teeth or segments. In such cases they take a position in the lines of least resistance, producing a permanent mal-

occlusion, also improper alignment to the center of applied force. This has the effect of producing more than one center and inharmonious action of the mandible, which would necessitate placing the jaw in a position to apply the force on the long axis of a tooth or teeth in the masticating movements.

Figure 5.



The opposite oblique application of the principles.

The result of all these minor defects tends to produce a total mechanical defect of the mandibular mechanism and a resultant permanent deformity.

STUDY OF THE MECHANISM OF MASTICATION AS A WHOLE.

It has been the misfortune of the profession that we have been compelled to study detail phases of many of these deformities instead of taking the study collectively as a mechanical whole. Our case is similar to the artist who dwells on the detail and overlooks the total scheme of his composition producing a mass of detail but no picture. A duty the dental profession owes humanity is to see that the child properly develops facial and cranial dimensions. This means more than merely proper mastication. It means the beauty of the individual when he reaches full development. The dental profession if it rises to its full possibilities will have more to do with the facial beauty of the coming generation than any other body of men. Were a new school to be founded whose

mission was the study of beautifying the human race during the period of development, this school would soon find that the basis of their operations must be the study of Dentistry in its advanced phases.

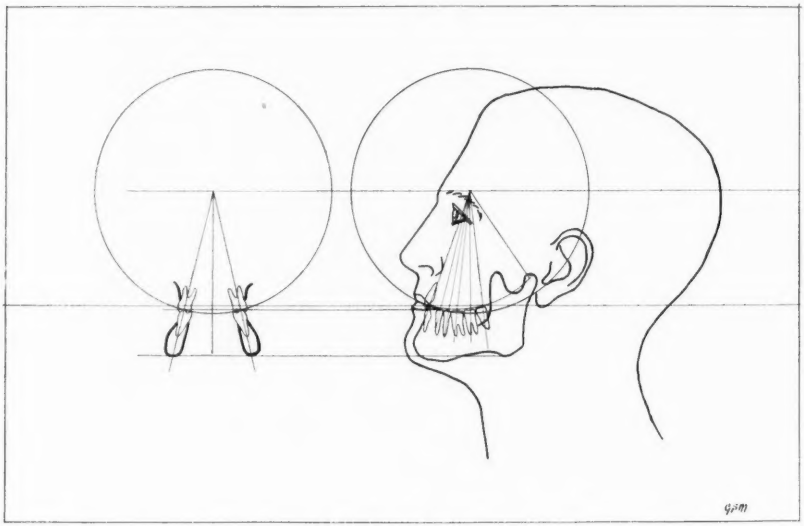
These advanced phases would be food and function in mastication, as food and function equal Force and Form. This means bodily strength and beauty. All beauty is founded upon well-balanced geometrical proportions, and well-balanced geometric proportions in the human face and cranium must come thru food and function.

As dentists, we must not confine our work to the individual tooth, but to the total masticating mechanism. This work comes well within the province of the dentist. The development of the entire human body depends upon your understanding of what its food and function should be.

Function is dependent upon food. It can possess its proper calories, but it also must possess resistance to properly develop the muscles of this mechanism. The bony structure or framework gives origin and attachment for the muscles and in turn will develop the proper dimensions to sustain them. Thus we develop an harmonious whole. So food and function will create force and form.

On the development of the jaws of the child, depends largely the development of the entire human body. Digestion can never be complete where the first step, that of mastication, which is a voluntary act, is neglected. The whole development of the entire body is impaired from an incomplete beginning. The perfect development of the human jaws is a first requisite and first evidence of a perfectly developed human body.

Figure 6.



A. Cross section showing the lines of force.

B. Anterior posterior section showing the conformity of the lines to a radial point.

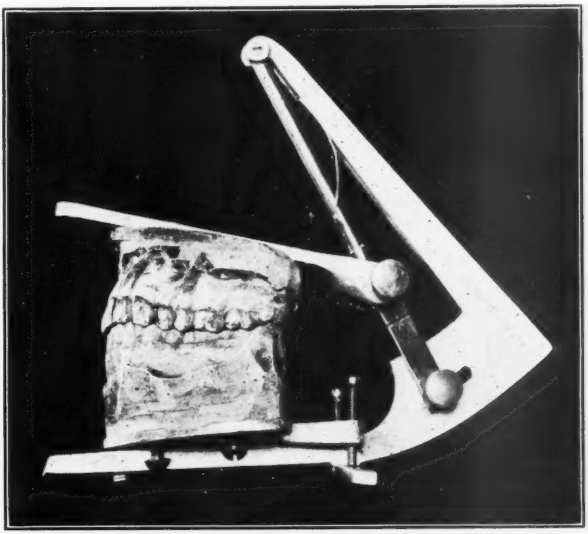
SECOND—THE BONES ADJACENT TO THE MAXILLARY BONES FORMING THE MASTICATING ORGANS OF MAN.

The crushing seat upon which the upper members or teeth are placed form a radial center in the superior maxillary bone, and are supported by a Pyramidal structure and conform to the general scheme of a segment of a sphere, approximating in its dimensions a four inch radius, are buttressed by the malar bones and the Zygomatic arch laterally, and by the palate bones distally and are supported on the median line by the vomer.

Let us consider this mechanism from an engineering standpoint, noting the features that are utilized in engineering practice. Within this Pyramidal structure we have the nasal passage. Laterally the antrum of Highmore forms coring or spacing for a structure that is light and yet gives the maximum amount of strength for the crushing base.

The seat of the condyles are placed on the base of the cranium and are supported from above by the temporal bone and laterally by the bones forming the base of the cranium and zygomatic arch, making a total of a powerful base upon which the superior maxillary bone and teeth articulate and occlude. The muscles have a general distribution above and verge upon the inferior maxillary bone.

Figure 7.

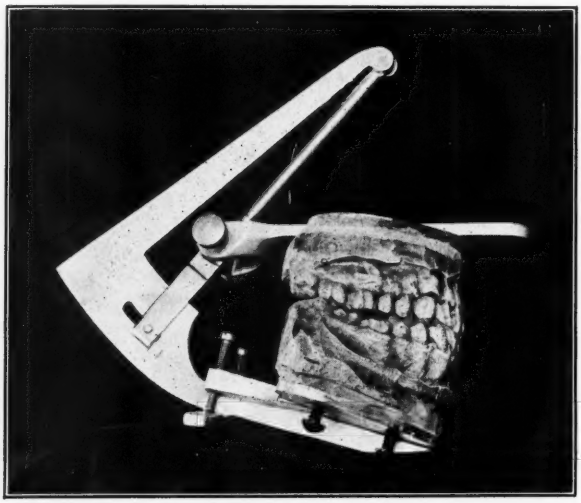


Full occlusion.

The total action of the muscles converge to a common center.

Thus we see the fixed point has a total general formation for the origin of the muscles to render the greatest power possible to their insertion. The muscles of mastication play an important part in the development of the base of the cranium as well as the masticating mechanism. This group of muscles demonstrate the physical law that to every action there is an equal and

Figure 8.



The excising position.

opposite reaction. As the origin of the muscles is in the facial and cranium bones and the insertion in the mandible, it plays an important part, according to this law, in the development of the cranial and facial bones. Function is the main factor in the developing of this entire mechanism to well-balanced geometric proportions.

THIRD—THE SEGMENTS OR TEETH MOUNTED IN THIS MECHANISM FORMING THE MASTICATING MEMBERS.

The occlusion of the teeth presents to the food the greatest amount of crushing surface at all times and in all positions within the range of occlusion.

This is due to the fact that the occlusion of the teeth is in the main at right angles to the lines of stress and no matter what positions the mandible may take in a forward or lateral position, they present the long axis of the teeth to

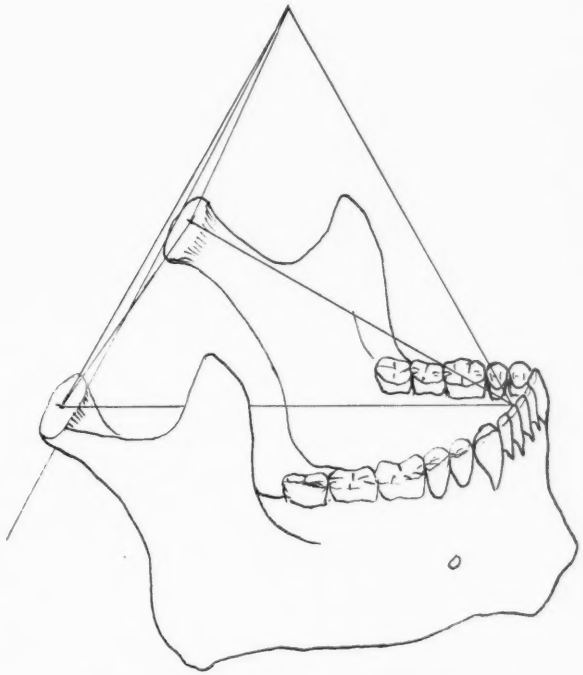
Figure 9.

Extreme lateral position.

the center of applied force or radial point, as illustrated in Figure 6.

The general conformity of the tooth and structure of the bone is modified to take care of the hinged action of the jaw, producing a Pyramid with a slight curve to conform to the hinging action of the jaw.

Figure 10.



The pyramid constructed on the "Bonwill Triangle."

If we consider the buccal cusps of the upper teeth continuous with the overbite and the lingual cusps of the same teeth as the crushing seat upon which the greatest amount of work is placed, we can readily see why the lingual cusps of these teeth are worn off. The reverse is true of the teeth in the mandible, the buccal cusps being worn off, producing an oblique surface on the occlusion to the long axis of the tooth which, would in time destroy the proper line of the force in the act of mastication, throwing the mandible out of balance in relation to the superior maxillary and producing malocclusion and a faulty relation of the bones. The greatest cause of the disturbance of the geometric balance in the entire mechanism is the malocclusion of the teeth caused by such an abrasion, forcing the jaw back and the condyle encroaching on the auditory canal, lessening the diameter of this canal for the sound waves, thus impairing the hearing of the individual.

This mechanism for mastication can be best illustrated by diagrams showing their relations at different positions in the range of occlusion.

Figure 7 shows full occlusion.

Figure 8 shows location of the mandible in the excising position and the extreme forward range.

Figure 9 shows the extreme lateral position when the mandible is in the act of crushing.

Any degree of angle intermediate between the extreme forward and extreme lateral positions is within the range of occlusion. This limitation has a marked difference in different individuals. The evidence of this is the over-jet. Where there is a marked over-jet we have the isosceles triangle.

In the well-developed jaw where the triangle has equal angles the forward range and lateral range is about equal.

FOURTH—THE NORMAL CONSTRUCTION OF THE JAW.

In the normally constructed jaw the equilateral triangle approximating four inches is in evidence.

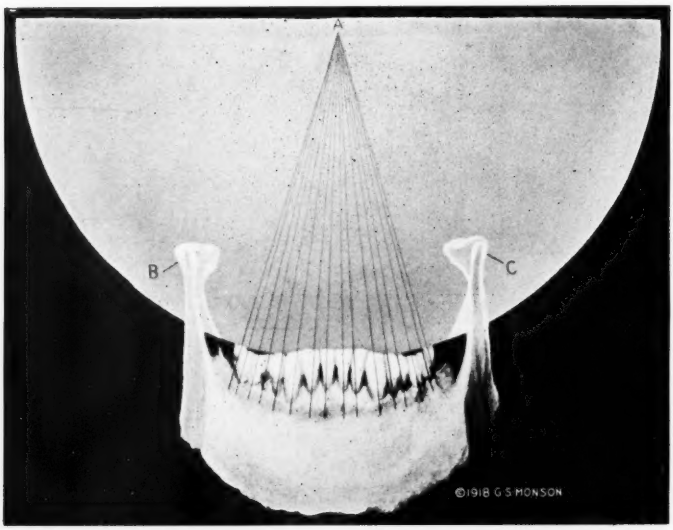
Let us once more define the anatomical dimensions upon which this triangle is placed as it forms the base of the spherical pyramid which is a segment of a sphere, which determines the radial center of the mechanism of mastication.

The line drawn from condyle to condyle I will designate as base. The lines drawn from condyles to medial incisal angle of lower incisors complete the triangle. The figure thus outlined is known as Bonwill's triangle.

A pyramid erected on this triangle as base with the angle lines of four inch length converge forming the center or radial point at the apex from which the radius of occlusion of each tooth is determined. This is illustrated by the outline drawing, Figure 10.

In the normal jaw, the occlusion of the teeth conforms to the surface of a sphere of eight inches in diameter whose center is the radial point. A line drawn

Figure 11.

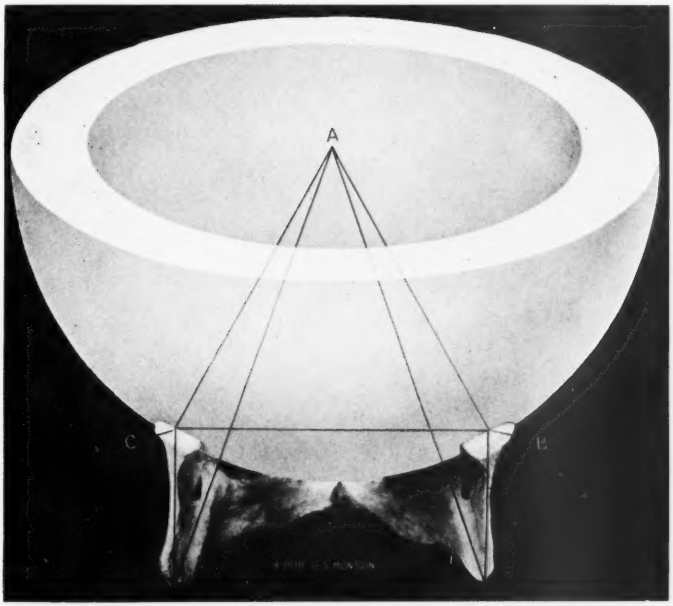


Illustrating the radial lines of force.

from the center obviously must pass thru the long axis of each tooth. This is illustrated by the front view of the mandible applied to the sphere, Figure 11.

The posterior view of the sphere applied to the mandible is illustrated by Figure 12. In this illustration, the center of the condyles are shown conforming to the surface of the sphere, giving the same radial dimensions from the centers of the condyles to the apex as from the points of occlusion of the teeth to the same radial center.

Figure 12.



The posterior view, illustrating the application of the radial lines to the condyles.

Thus we see that this radial center must be the center of applied force in our mechanism of mastication. It is also the center of the entire muscular action. This is evident as the development of the angles of the jaw conforms to the radial lines centering at A, the common center as shown in Figures 12 and 13.

A Simple Method of Testing a Normally Constructed Jaw.

That you may apply to any mandible the rules or proportions that demonstrate it to be normal or abnormal, let us consider a test which I have worked out by experience with many sets of teeth which come under my observation in connection with demonstrating my theory that the equilateral triangle is the normal basis of construction of the mandible.

The simple method of determining the radial center and the dimension of the triangle forming its base is to cut a circle of cardboard with a radius of four inches; divide it into semi-circles, using one of them as in illustration, Figure 14.

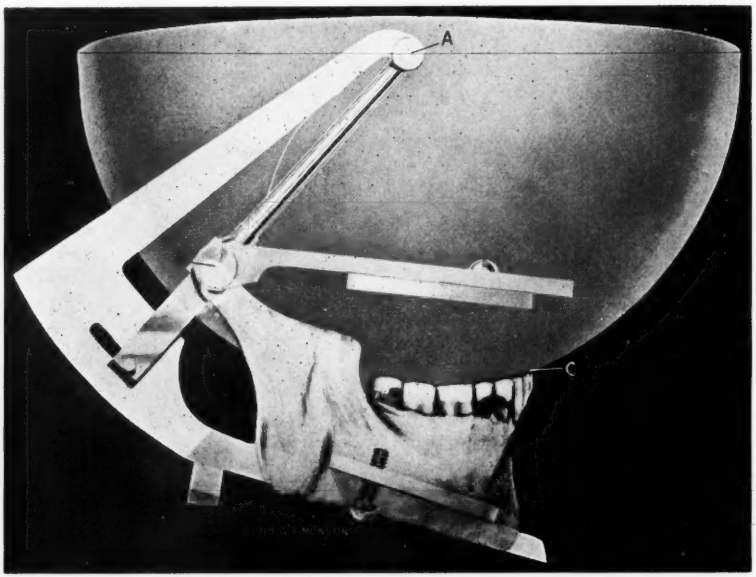
Divide it into segments as in Figure 14, so that the combined smaller segments form the third side of a spherical pyramid with three equal sides. The

lines at the base will represent the Bonwill triangle when the pyramid is formed by joining the two sides EA and AF, and fastening them in place with a paper clip.

The application of this spherical pyramid to the mandible to determine proportions is illustrated in Figures 15, 16 and 17.

You will note that the distal angles pass thru the radial center of the condyles and the anterior angle resting on the medial incisal angle of the lower teeth. In case of a perfect mandible, it

Figure 13.



Side view of the sphere applied to the mandible.

Figure 14.

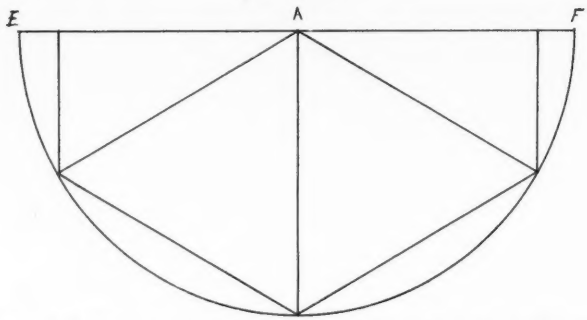
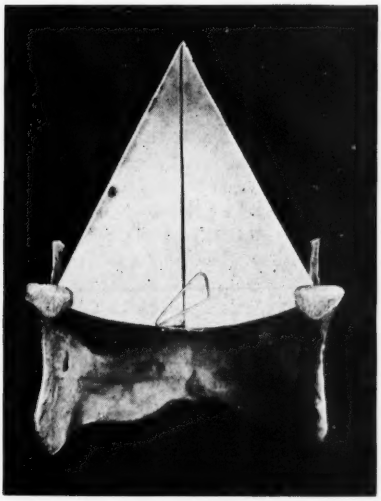


Diagram showing the construction of the spherical pyramid from cardboard.

will have balanced geometric proportions or an equilateral triangle.

The Bonwill triangle used on the mandible shown in the specific case, Figure B is an isosceles, the condyles being three and one-half inches from center to center. The one-half inch which it lacks of being normal is divided and added to the lineal measurements of the other two sides.

Figure 15.



Showing the application of the spherical pyramid to the condyles.

I have made observations on many mandibles and the evidence gathered in my research all points to this general rule.

In case of a shortening of the condyle to condyle dimension, nature endeavors to compensate by the elongation of the lateral sides.

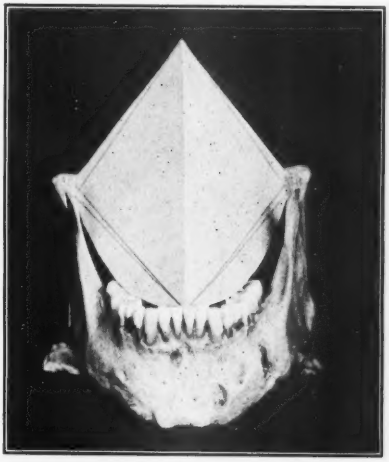
The fact that we find a variance in both directions from the equilateral triangle further strengthens the assumption that the normal mandible is the one outlined by an equilateral triangle.

The evidence of my total investigation to the present time points, conclusively to this fact that the mandible based on the equilateral triangle is the highest form of development in the basic construction of the human jaw.

FIFTH—ANATOMICAL MALFORMATIONS OF THE MANDIBULAR MECHANISM.

Malformations of the mandible are deviations from the equilateral triangle of approximately four inches.

Figure 16.



The front view of the application of the pyramid.

Mandibles with the isosceles triangle and mandibles based upon acute triangles are abnormal developments. In such cases one of the lateral sides is shorter from incomplete functional development than the other, forming an acute triangle with unequal sides and angles. This constitutes a typical form of malformation and is due to an impaired function.

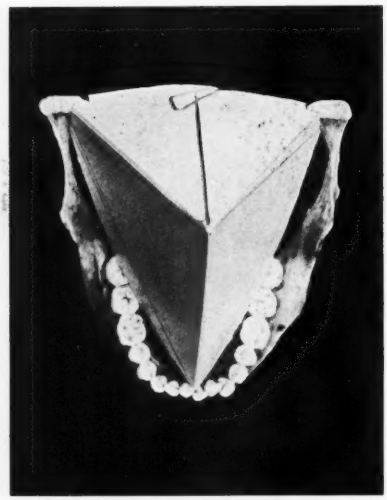
This covers in a general way the malformations arising in the course of development of the mandible.

Having reached complete development, another form of deviation from the

normal arises after the full development of the individual. This is in reality a retrogression and is common in middle age.

This deviation consists of a shortening of the lateral sides of the triangle and an increase in length of the line from condyle to condyle, approaching an obtuse triangle. This development of

Figure 17.



Looking down upon the mandible, showing the angles of the pyramid from the radial center.

the mandible in later life is no doubt the cause of many obscure disorders.

There is one of these to which I particularly wish to call your attention. This cause of broadening between the condyles is due to a wearing away of the teeth and a consequent unbalancing of the muscular mechanism bringing about a backward thrust of the mandible encroaching upon the auditory canals. This I am convinced is the cause of a great deal of deafness, not only in people of advanced years but of many individuals in their prime.

SIXTH — THE CONSTRUCTION OF CROWNS AND BRIDGEWORK IN SUCH A MANNER AS TO ALLOW FREEDOM OF RANGE OF OCCLUSION, PRODUCING THE HARMONIOUS ACTION AND PERMANENT HEALTH OF THE UNITS.

The work of constructing crowns and bridges to replace lost segments in the mouth can be carried under as exact rules and principles as those employed in architecture or engineering.

These rules are based upon estimates made from the radial center of the spherical pyramid of which the Bonwill triangle is the base. The deviations from the normal in the construction of the mandible must be taken into account in the application of these principles.

A patient presents himself requesting a restoration of lost members of his mechanism of mastication, either by fillings, crowns or bridge-work. X-rays are taken of the roots of the teeth in position and other diseased conditions. I would suggest in all cases where the teeth are worn, throwing them out of position, that full impression of upper and lower teeth be taken. Place these casts in an instrument which will reproduce the correct movements giving the occlusion and its full range as found in the mouth. It is further proven by a series of check bites in sheet wax taken from the mouth of the patient, in various contact positions. The occlusial surfaces of the teeth of the casts thus mounted should come in contact in the check bites absolutely as found in the mouth. This is the proof that they are in correct relation in any position taken by the mandible.

Another point in diagnosis is a test as to the displacement of the mandible due to the backward thrust caused by the abrasion of the teeth, and lessening of the distance between the chin and the nose, shortening the anterior angle of the pyramid, from the radial center to the mesial incisal angle of the lower incisors.

This test is made standing in front of

the patient and placing the little fingers in the auditory canals and pressing forward toward the condyles as the patient opens and closes the jaws to full occlusion. If you feel the backward thrust of the condyles on the fingers you may be positive that the patient's bite is too short. Further evidence of this may be secured by placing two sheets of base plate wax between the teeth and noting a diminution of the backward thrust of the condyles as the patient opens and closes his mouth to this new dimension. In the majority of these cases it will be necessary to open the patient's jaws from two to five millimeters when in the position of full occlusion. Bear in mind that in many cases of forward dislocation of the mandible in the act of yawning the function throws the muscular action so the mandible is carried forward slipping over the anterior process giving a positive forward thrust of the mandible. Again the backward thrust is produced by a wearing away of the natural teeth causing a too short dimension on the anterior angle of the pyramid.

With the casts on the instrument use a six inch divider set to four inches with one point curved to be placed on the radial center and the other point sweeping the occlusal surfaces of the lower model. You will note that all the teeth in function have equal radius with the condyles. This will be found to be approximately four inches and all teeth out of function or partially so will be found elongated or tipped in the line of least resistance, thus destroying their function because of their occlusion not being a tangent to a radial line of the sphere. In certain ones of the teeth the occlusion may be worn obliquely to a radial line, which must be restored if their permanent position is to be maintained.

Elongated teeth must be reduced in their length and teeth that have been in excessive function built up to their proper occlusion, bringing the occlusion of all the teeth to conform to the surface of the sphere having proper interlocking cusps to maintain them in their alignment. The teeth are then ground into the full range of occlusion.

If this mode of procedure is neglected it is similar to the man who buys an old house, painting and decorating it before using the square and level to put it in plumb.

The real engineer would see to it that it was plumb and of true angles before spending money on the decorating. Let us as dentists determine the position and relation of the mandible to the adjacent structures and build our improvements so that they will be permanent and real in value to the patient.

THE ANATOMY AND PHYSICS OF THE TEMPOROMANDIBULAR JOINT.

By George H. Wilson, D.D.S., Cleveland, Ohio.

(Read before the National Dental Association at Its Twenty-third Annual Session, New Orleans, La., October 20-24, 1919.)

IT MAY be stated as a truism that the anatomy and physiology of the temporomandibular joint are constants, that thruout a period of many generations there is no appreciable change. However, it must always be recognized that there are many variations from the fundamental type; but, that the underlying principle is the same in all cases. It has been said that variation in anatomy is the rule, and the type the exception. Accepting the statement as in a broad sense true, the motive of this paper will be to determine the underlying principles of the function of mastication.

It is recognized also that sciences are developed by stages, that the first statement of a truth is hedged about by errors which are gradually eliminated. For instance, the arteries were considered as air passages, hence the name; the physiological differences of the human organism were attributed to the "humors" of the body, hence the temperaments; and the mandible was considered as a lever of the third class.

The subject of this paper in its most concrete form is: THE MANDIBLE IS NOT A LEVER OF THE THIRD CLASS.

It is the purpose of this paper to detail the evidence upon which this statement is based and thereby establish its soundness; also to direct attention to its far reaching importance in prosthetic dentistry.

Chart I, will fix in the mind the three classes of levers.

Class one need not be considered, classes two and three are of some importance in this study. They are incidentally but not primarily factors. In class three the power is between the fulcrum and the work, thus the power is expended between the fulcrum and the work. If the function of the superficial portion of the masseter and internal pterygoid only were involved, then the mandible would be a lever of the third class, and from one-fourth to three-fourths of the power would be expended upon the fulcrum (the condyle). This would imply a great sacrifice of energy, and a destruction of tissue. The sacrifice of energy is self evident, and the destruction of tissue has been demonstrated by Prof. H. J. Prentiss, of the University of Iowa, and will be referred to later.

For a clear mental vision of the temporomandibular joint, a resume of the anatomy of the parts is presented.*

CHART II.

The joint consists of the Mandibular Fossa of the temporal bone, the Condyle of the Mandible, the Articular Disk, and

*The nomenclature and quotations of descriptive anatomy are taken from Gray, Twentieth Edition, 1918, revised and re-edited by Prof. Lewis, of Johns Hopkins University.

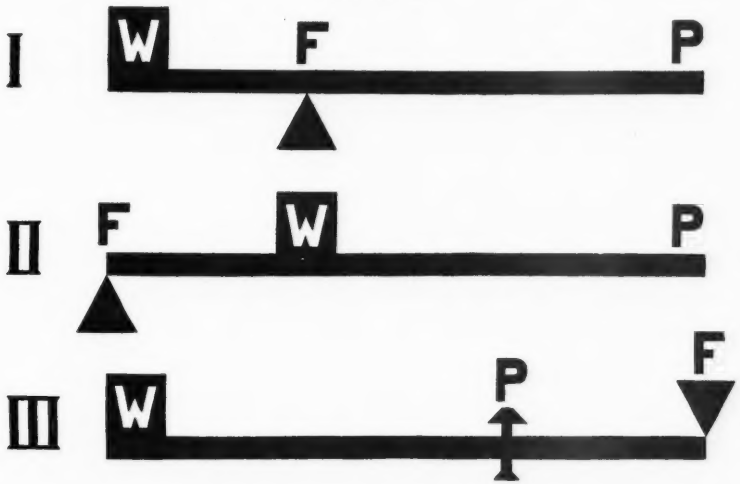
the two synovial membranes, the upper and lower. These parts are all enclosed in the Articular Capsule.

The auxiliary ligaments are: Temporomandibular, Sphenomandibular and Stylomandibular.

The chief muscles of mastication are: Masseter, Temporalis, Pterygoideus externus, and Pterygoideus internus.

The auxiliary muscles of mastication

CHART 1.



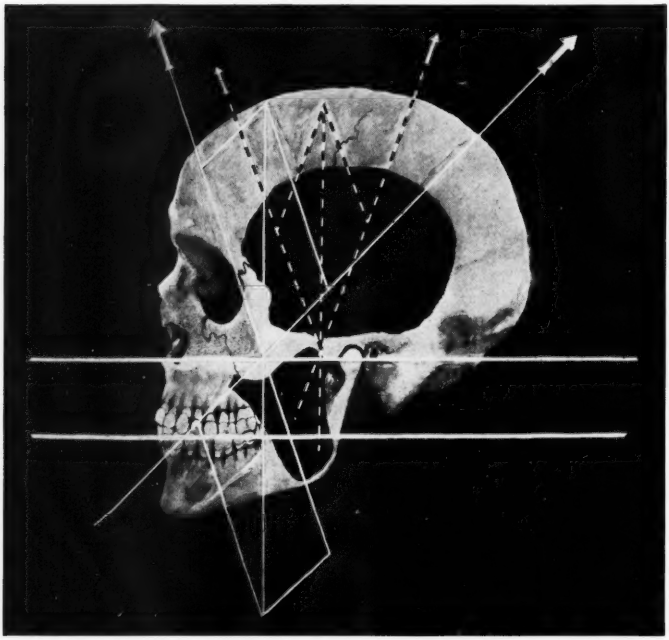
are: Platisma, Digastricus, Mylohyideus, and Geniohoideus.

Gray says (Page 298): "The movements permitted in this articulation are extensive. Thus, the mandible may be depressed or elevated, or carried forward or backward; a slight amount of side-to-side movement is also permitted. It must be borne in mind that there are two distinct joints in this articulation—one between the condyle and the articular disk, and another between the disk and the mandibular fossa. When the mouth is slightly opened, as during ordinary conversation, the movement is confined to the lower of the two joints. On the other hand, when the mouth is opened more widely, both joints are concerned in the movement; in the lower joint the movement is of a hinge-like character, the condyle moves around a transverse axis on the disk, while in the upper joint, the movement is of a gliding character, the disk together with the condyle, gliding forward on the articular tubercle, around an axis which passes thru the mandibular foramina. These two movements take place simultaneously, the condyle and disk moving forward on the eminence, and at the same time the condyle revolves on the disk. In shutting the mouth, the reverse action takes place; the disk glides back, carrying the condyle with it, and this at the same time moves back to its former position. When the mandible is carried horizontally forward, as in protruding the lower incisor teeth in front of the upper, the movement takes place principally in the upper joint, the disk and

condyle gliding forward in the mandibular fossa on the articular tubercle. The grinding or chewing movement is produced by one condyle, with its disk, gliding alternately forward and backward, while the other condyle moves

drawn forward by the simultaneous action of the Pterygoideus internus and externus, the superficial fibres of the Masseter and the anterior fibers of the Temporalis; and backward by the deep fibers of the Masseter and the posterior

CHART 2.



simultaneously in the opposite direction; at the same time the condyle undergoes a vertical rotation on the disk. One condyle advances and rotates, the other condyle recedes and rotates, in alternate succession.

"The mandible is depressed by its own weight, assisted by the Platisma, the Digastricus, the Mylohyoideus, and the Geniohyoideus. It is elevated by the Masseter, Pterygoideus internus, and the anterior part of Temporalis. It is

fibres of the Temporalis. The grinding movement is caused by the alternate action of the Pterygoidei of either side."

This statement is concise and probably is the latest accepted description by anatomists of the composition and action of the Temporomandibular joint. The study of the physics of the individual muscles and of their combined action, will help to develop an understanding of the function of the masticatory apparatus.

The function of a muscle fiber is to draw its inserted end towards its origin in a straight line. Two or more muscles that are not parallel but acting simultaneously will produce a resultant action. The resultant action is influenced by the ratio of the power of the muscles involved as well as by the direction of their individual activities. It is by the result of the combined action of the muscles that their function is determined. Therefore, the parallelogram of forces will demonstrate the physics of mastication and the principle included.

The superficial portion of the masseter, and the internal pterygoid muscles act in conjunction with each other in a direct thrust, and in a vertical and forward direction, at approximately an angle of twenty-five (25) degrees from the perpendicular. (See Chart 2.) The posterior portion of the temporal muscle acts also in the direct closing thrust of the mandible; however, its line of force is upward, and about forty-five (45) degrees from the perpendicular backward. (See Chart 2). As the power of the combined action of the masseter and the internal pterygoid is two or three times as great as that of the temporal muscle, the parallel lines of the parallelogram representing the thrust of these muscles must be two to three times as long as the parallel lines representing the thrust of the temporal muscle; therefore, the diagonal line of an oblique parallelogram will represent the resultant of the action of these three muscles. As the resultant is at right angles to the occlusal plane, it is evident that the whole force of these muscles is expended upon the bolus of food and not any portion of it upon the condyle. Therefore, the condyle is not a fulcrum and the mandible is not a lever of the third class.

This diagram is the true physical demonstration of the action of the muscles, however, a variation of the demonstration may be more easily comprehended. As force acts in a straight line, and a force acting upon a solid body acts upon every portion of that solid body in parallel lines; therefore the action of the temporal muscle attached to the coronoid process is just the same as if the attachment were carried forward to the apices of the incisor teeth. By constructing the parallelogram below, and to this extended line, it may be easier to conceive of the resultant force being at right angles to the occlusal plane. (See Chart).

A further proof that the mandible is not a lever of the third class is found in the parallelogram of forces constructed upon the lines of force of the deep portion of the masseter which draws the mandible upward and backward; and the anterior portion of the temporal muscle which draws the mandible upward and forward. The resultant force of these minor portions is in the same direction as the resultant force of the major portions of these muscles; however, they act as a stabilizer, and make more positive the intent of the action of these muscles. (See broken lines of Chart 2.)

Another positive evidence that the mandible is not a lever of the third class is found in the action of the external pterygoid muscle. This muscle is inserted into the neck of the condyloid process of the mandible and into the articular disk. (See Figure a, Chart 3.)

CHART III.

The function of this muscle is to draw the mandible and articular disk forward and inward. This results in drawing the condyle and articular disk, with its lubricating sacks, on to the articular tubercle (eminentia articularis). Therefore, if the mandible is a lever of the

third class, then the fulcrum consists of a lubricated inclined plane, a mechanical construction unthinkable of our conception of the Omnipotent Architect. Hence, if the articular tubercle does not function as a fulcrum, the mandible does not function as a lever of the third class.

Another very strong evidence that the mandible is not primarily a lever of the third class was presented by H. J. Prentiss, M. D., Professor of Anatomy, at the University of Iowa, in a paper published in the Dental Cosmos, June 1918. This is an exceedingly interesting article and can be read with profit by every member of the dental profession. The paper is based entirely upon laboratory investigations of various joints. He considers the histology of the knee joint from early embryonic to adult life. He says: "We see therefore in the knee joint a retrograde absorption of the meniscus (articular disk) which is necessary to a normal function of the joint. The sequence of events just followed in this joint (knee) may be traced to the mandibular joint, only here it becomes pathological with the loss of the teeth."

This is positive evidence that the action of the mandible is not primarily a lever of the third class, and that when it does become such, as the sequence of the loss of the teeth, then it results in a greater, or less destruction of the articular disk.

These four evidences show conclusively that nature did not design the mandible as a lever, but as the moving part of a mill.

Consider the masticatory apparatus of man as a mill. This can best be done by inverting the head, when the maxilla become the nether millstone and the mandible the upper and movable millstone; the maxillary molars and bicuspids represent the convex surface, and the molars and bicuspids of the mandible represent the concave rotating or triturating surface; the rami are balancing arms supported by ball and socket joints, the movements of these joints are limited in scope by the ligaments; and the milling power is furnished by the muscles.

This arrangement would result in the loss of gravitation and require more power in separating the millstones for the insertion of the grist, and would place

CHART 3.

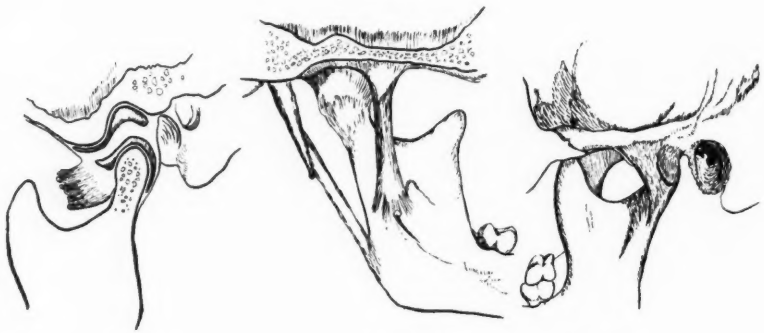


Figure a. Figure b. Figure c.

more pressure upon the articular disk causing the perforation of the articular disk to become a physiological process, which is not the intent of nature. Nature reversed this order and suspended the movable millstone, thus conserving energy, reducing friction and preserving tissue. This suggests the function of the ligaments and facia. This principle of suspension in mechanics is used in some of the greatest engineering schemes of man. For instance, the electric power plant at Niagara Falls, where the generating power consists of a column of water falling 185 feet and entering the turbine wheel from beneath, thereby reducing friction to a minimum and providing a maximum of energy.

The last of the assemblage of factors to be presented as proof that the mandible is not primarily a lever of the third class is the purpose and action of the ligaments. The purpose of ligaments is to act in the capacity of a rope. They are flexible, but neither elastic nor contractile; they act to suspend and to restrict. The action of the temporomandibular ligament should be elucidated. The quotation from Gray's Anatomy, previously given, states: "In the upper joint, the movement is of a gliding character, the disk, together with the condyle, gliding forward on to the articular tubercle, *around an axis which passed thru the mandibular foramina.*" The location of this axis is an error, which is based upon the supposition that the stylomandibular ligament is the fixation forming this axis. (Figure b, Chart 3.)

Such an action is an impossibility, for if this rope-like attachment existed the mandible could not be protruded. It is the temporomandibular (external oblique) ligament that performs the function of the axis of rotation of the upper joint. In opening the mouth, the head of the condyle first rotates on an axis on the under surface of the articular disk, as stated by Gray, when the temporomandibular ligament is made taut, its insertion at the neck of the condyle becomes the axis of rotation, and the head of the condyle and articular disk travel forward on to the articular eminence. (Figure c, Chart 3.)

As this ligament passes from the zygomatic process of the temporal bone downward and backward to the neck of the condyle its pendulous nature permits protrusion of the mandible, whereas the fibres of the stylo-mandibular ligament pass downward and forward and cannot act as the axis of rotation and permit protrusion. Therefore, as it permits protrusion it is not the axis of rotation.

The stylomandibular and sphenomandibular ligaments are long thickened bands of Fascia Colli (deep cervical fascia) and function as pendulous suspensors. Incidentally these ligaments, with the other temporomandibular ligaments, may aid the mandible in acting as a lever of the second class, just as certain conditions may arise so as to cause the mandible to act as a lever of the third class; but these are not the primary or normal functions. Therefore, the temporomandibular joint is a compensating joint, and designed to aid the various factors in the masticatory apparatus in conforming to requirements.

This evidence and reasoning should and does establish the soundness of the statement that the "Mandible is not a lever of the third class."

The first purpose of this paper being accomplished, the second can be disposed of quickly.

It is an axiom of logic that—If the premise of a proposition is false, the

conclusion is false. Therefore, as the teaching of, and the instruments for the anatomical articulation of artificial teeth are based upon a false proposition, it follows that the methods of construction of artificial dentures are wrong. However, the profession is deeply indebted to the late Dr. Bonwill, for his pioneer work; Prof. Gysi for his investigations and especially for his demonstration of the variable rotating centers; Mr. Norman G. Bennett for his demonstration of the lateral mandibular movements; and Dr. Rupert E. Hall for his practical application of the correct principles, and his demonstration of the falseness of some of the supposed principles of denture construction.

It is a logical conclusion that the movements of the temporo-mandibular joint are of very minor importance, valuable only as a confirmation of the action of the muscles and the restraining influence of the bone surfaces and ligaments. The sequence is that the millstone (the teeth), their position and surfaces, their stability, and the direction of the power employed are the essential factors in the mechanical construction of artificial dentures. It is always apropos to mention the esthetics of artificial dentures, therefore the essential factors in denture restorations are a thoro comprehension of the anatomy, physics and esthetics; and a suitable technic.

If this paper has established a sound, sane and scientific premise for the future teaching of dental prosthetics, its purpose has been accomplished.

P. S.—As this paper goes to press, the development and function of the temporomandibular ligaments are being questioned and subjected to further study. Whether the ligament exists, or not, makes no practical difference to the prosthetists.—Author.

THE PROBLEM OF RETENTION.

By C. A. Hawley, D.D.S., Washington, D. C.

(Read before the National Dental Association at Its Twenty-third Annual Session, New Orleans, La., October 20-24, 1919.)

THE Problem of Retention is the most perplexing problem in Orthodontia. While much thought has been given to this question and its unsatisfactory condition has been well recognized, yet, as stated recently by a well-known writer and practitioner of Orthodontia, no substantial progress has been made in the past fifteen years. The art of moving teeth has advanced far beyond the art of retaining them. It is true that refinements in construction of these appliances have been made and the requirements been more clearly recognized; yet, the essential principles of them have not been changed.

The essential character of all retention appliances, except the one I will present to you in this paper, is a lingual wire attached to bands cemented on the molar teeth and bands and spurs on all teeth that have been rotated. This construction compels the binding together of the molar teeth and prevents their response to the forces of mastication, as is also true, to some degree, with all banded teeth. It has been observed that the more rigidly a tooth is held during retention the more liable it is to move when the retention is removed. The reason probably is that under rigid support the tissues that naturally support the tooth are not developed during the retention period.

One of the greatest dangers of the usual form of retention is liability of teeth to decay under loosened bands. Another is the injury to the peridental tissues thru the impinging of bands and wires on these tissues. Wires, tho they may be properly and safely adjusted at the beginning, often become bent or displaced by the stress of mastication and so cause injury and undesired movement of the teeth during the retention period.

The safe period of retention is variously estimated as about twice the period of active treatment. This, in many cases, is far too short. But taking this estimate as the average, we must, if it takes from a year to eighteen months for the active treatment, keep cemented bands and rigid attachments on the teeth for three to four and a half years, far too long for the safety of the teeth.

The greatest danger to the teeth from cemented bands occurs during the period of retention; for during that period visits for inspection are at longer intervals and much more irregular. A retention appliance, therefore, that would be free from cemented bands would lessen the liability to injury from these causes about two-thirds and place the remaining third during the time of active treatment when the patient's visits are regular and frequent.

The retainer which I wish to describe obviates most of the objectionable features given above and is removable; so that during its use, the teeth are free from bands and any operations in the province of periodontia or operative dentistry can be performed without any

hindrance whatsoever. In previous papers credit has been given to Dr. R. D. McBride of Dresden, Germany, for the fundamental principle involved in

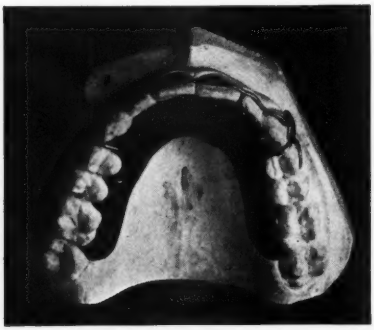


Figure 1.

this appliance, viz: the method of retaining rotated teeth without bands.

The appliance (Figure 1) consists of a skeleton plate accurately fitting the lingual surfaces of the teeth. From the plate back of the cuspids, where there are spaces even in the most closely

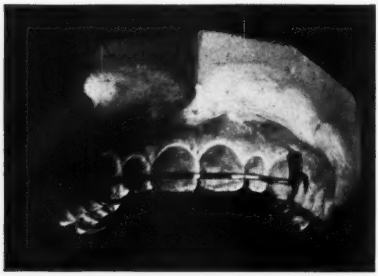


Figure 2.

occluding dentures, passes a nineteen gauge clasp gold wire, which is formed into loops and between them, passing over the labial surfaces of the incisors, is a flat or ribbon wire .022 x .036 (Figure 2). Attached to and extending backward from the loops are bicuspid clasps (Figure 3). On the lower, a wire hook is imbedded in the plate and lies in the sulcus between the lingual cusps of the first molars to keep the plate from being pressed down at the posterior portion (Figure 4).

Figure 3.

The vital principle in this retainer, as stated before, is in its ability to hold teeth which have been rotated, without bands and spurs. Removable retainers have been used to a limited extent in the past, but only in cases where no teeth have been rotated. It can be seen that in this device in order to rotate, a tooth

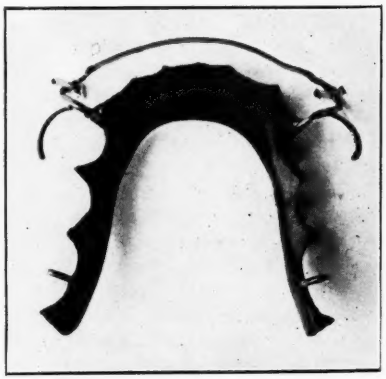


Figure 4.

must lift away from the closely fitting palatal surface (Figure 1). This, the labial wire effectually prevents. If a tooth is seen to start in this movement, the wire can be made to press harder

at this point and the tooth will quickly return to its old position and the movement will be stopped.

Round lateral incisors or lower second bicuspids, if rotated, cannot be held by this retainer for obvious reasons. In the case of the second lower bicuspids, I have used bands with a flat vertical bar, (Figure 6) or a band and spur.

A very important feature of the retainer is the bicuspid clasps. These clasps spring over the convex surfaces of the bicuspid teeth and lie at rest

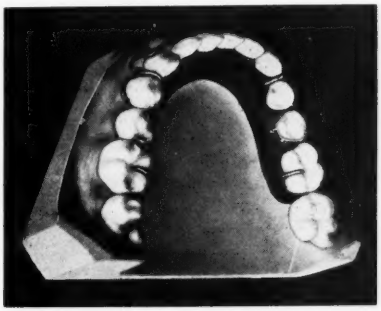


Figure 6.

without tension just above the gum margin. They are adjustable, that is, they may be tightened to any tension desired and hold the plate securely in place. No effective plate of this nature could be held in the mouth comfortably and exert the necessary pressure without efficient clasps.

The overbite and distal occlusion is corrected and retained by means of a shelf or bite plane (Figure 7), built on the plate, assisted by the exercise of the facial muscles, as developed by Dr. Rogers, of Boston.

As the construction of this retainer has been described in former papers, published in the June 1918 "Items of Interest" and "Cosmos", it will be unnecessary to dwell upon it here.

My use of this retainer has been limited to cases where the denture is complete or where there are no deciduous teeth remaining in the mouth. As soon as the teeth are in satisfactory position, I remove all bands and appliances and construct the retainers. They are worn constantly for six months, except that they may be taken out for cleaning and during meals and for an hour or so for any special occasion. After about six months they are worn only at night,

Figure 7.

and after a year they can be kept and placed in the mouth every week. If they go in easily, it is evident that teeth have not moved and they may be left out again. If they bind and go in hard, the nightly wearing must be continued.

From the aspect of the problem of retention a few points only need to be emphasized.

The advantage from the standpoint of Prophylaxis is too self-evident for much discussion. As pointed out in the beginning of the paper, the period of wearing cemented bands and fixed appliances is reduced two-thirds and the most dangerous period eliminated.

The use of the teeth in mastication is

unhampered during this period and the peridental tissues can respond and be stimulated by the free individual movement of the teeth.

It is not necessary to guess at the time of retention and then find when it is too late that you have guessed wrong. You place in your patient's hands, an appliance which they can intelligently use until it is no longer necessary and can give positive assurance that if so used the teeth will stay where placed. I think I can safely estimate that ninety per cent of the cases can be retained in this manner and in my own experience a considerable larger percentage.

I have in the last three years used over four hundred of these retainers, with fewer failures than with any other method of retention I have ever used.

DISCUSSION.

C. A. Spahn, Newark, New Jersey.

I would like to ask Dr. Hawley if he depends entirely upon vulcanite for his plates.

H. E. Kelsey, Baltimore, Maryland.

I wish to say that I have been using this retainer myself for the last year, with ever increasing success and satisfaction.

Dr. Hawley will answer the question of whether it can be used in all cases or not, better than I could. However, in almost every case where the temporary teeth have been lost and the permanent teeth have been erupted, I use it without exception, and my satisfactory experience is that of a good many other men, who have been using it.

Dr. Waldron of Newark, I understand, has put in more than 200 of these retainers, so you can see it has become popular with men who do a great deal of orthodontia.

C. A. Hawley, Washington D. C.

In regard to the use of Vulcanite, I use it exclusively for reasons which I did not go into here. I prefer it because of its elasticity. If these retainers are well made of Vulcanite, they are elastic, and if they are left out of the mouth, and the teeth have moved by forcing it in and wearing two or three days, the teeth will return to their former position. It was my idea that the ideal retainer of this kind must be of gold, but my experience has compelled me to abandon that idea entirely. Someone asked if I used this retainer in all cases. I would answer *no.* In my opinion, nothing will ever be devised that can be used in all cases.

Dr. W. C. Fisher, New York: Could it be used?

Dr. C. A. Hawley: I use it in probably ninety per cent of my cases. The distal occlusion is taken care of by the inclined plane and the muscle exercises.

WHAT CONSTITUTES GOOD VULCANIZING?

By Dr. George B. Snow, Long Beach, Cal.

(Read before National Society of Denture Prosthetists, 1919, New Orleans, La.)

DURING all the years that vulcanite has been used as a base for artificial dentures there has been but little change in the methods employed by dentists for vulcanizing. Many improvements have been made in vulcanizing apparatus, one of which, the Mercury Bath Thermometer, has proved a stumbling block to dentists; altho it is one of the greatest improvements that has been made, so far as vulcanizing apparatus is concerned. It was many years before it was noticed that the Mercury Bath, by reason of its deterrent effect upon the transmission of heat to the thermometer tube, allowed the vulcanizer to be actually some 18° or more hotter than the thermometer registered. The effect of included air upon the thermometer was not noticed for many years. These facts are now better understood and, as a consequence, the mishaps attendant upon vulcanizing are not nearly so frequent as they once were, but they still occur. Teeth are insecurely held in the vulcanite, and there are unsightly gaps apparent at times which detract from the appearance of the work and render it unsanitary.

It came to the writer, about forty years ago, when he was investigating some of the phenomena attendant upon vulcanization, that the conversion of the compound of Caoutchouc and Sulphur into vulcanite was attended by a notable amount of shrinkage; and it was at once perceived that this fact was the cause of some of the difficulties encountered by dentists in their prosthetic work. Upon further experimenting it was found that the amount of shrinkage was diminished by the addition of extraneous substances, such as the vermilion, used as coloring matter. The black vulcanite, which contained but little more than Caoutchouc and Sulphur, was notoriously much more troublesome to use successfully than was the red vulcanite, which contained a very considerable proportion of vermilion in its composition; this difference between the working qualities of red and black vulcanite being well known to dentists as a fact. The shrinkage attendant upon vulcanization, however, when brought to notice as accounting for this difference, received but scant attention. The application of spring pressure upon the flask for closing it was urged as a convenient means for obviating the annoyances attendant upon the shrinkage during vulcanization, and various appliances for producing spring pressure have been devised and used; but to this day, probably not many more than one-third of the Dental Schools in the United States use anything but the old fashioned rigidly bolted flask in their teaching, and when they do this in the laboratories, it is a fair presumption that the shrinkage attendant upon the conversion of rubber compound into vulcanite receives scant mention, if any, in their didactic instruction; and now

at the expiration of forty years, the matter has but lately received any attention in the text books.

In order to answer the question propounded as a title to this paper it may be well to follow the process of vulcanization thru, from flasking the case to the removal of the vulcanite denture from the flask. There are many of the minutiae which are too well known to require mentioning, but each is nevertheless important in its way. Of these, the first is the plaster which is to be used. This must be capable of setting so as to form as hard and as resistant a mass as possible; and this depends very much upon the manner in which it is mixed. The less water used, the better, if the plaster can be properly worked. If water is added in sufficient quantity so that the plaster flows readily, the resulting mix will not be as hard, after it has set, as it would be if it is stiff enough so that it requires some jarring to make it flow. This is particularly true when pouring the cast or model, for this must sustain any pressure which may be brought upon it. If it yields ever so slightly, the result is likely to be an impairment of the fit.

The flask used should be well fitted, the sections should not rock upon each other when placed together, and the guide pins should fit their notches accurately and perfectly; so that while the sections of the flask will separate easily, there shall not be the slightest lateral movement when they come together.

After the plate is flasked and the flask is separated, the removal of the trial plate from the mold is a matter of routine; but it is well to save every particle of it and mold it into a compact mass in order to be able to ascertain the exact amount of rubber compound necessary for the case. This is done by the Immersion Process, which is well known.

Cutting the Gateways.

Illustration No. 1, a familiar one in the text books, shows the manner which is usually advised for performing this operation. It is by no means the best method, for it affords too little room for surplus, and leaves too much of the face of the plaster which comes into contact with that of the other section of the flask, when the flask is closed. There are plenty of notches thru which the rubber may escape from the mold,

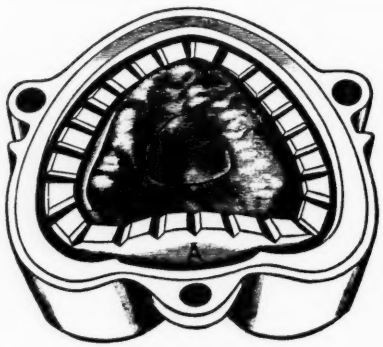


Fig. 1

and too little room to receive it after it has escaped. Some of this rubber, if there is any quantity of it, will certainly be caught between the opposing surfaces of the plaster, and while it may be pressed into a fairly thin sheet, it cannot be completely expelled by any pressure which may be brought upon the flask to close it, and the result may be defective articulation of the teeth. If the flask is to be closed by rigid bolts, the notches leading from the mold for the escape of the rubber are necessary, but the result is a deficiency in vulcanite in the denture.

The method shown in Figure 2 is much preferable. Here, all the surface of the plaster is removed so that there is a large overflow chamber completely

encircling the mold, with only a narrow margin remaining of the original surface of the plaster. This is left without the escape notches, and the expansion of the rubber with which the mold is packed will separate the two sections of the flask, if it is closed under spring pressure. The rubber will then escape thru the interval between the two sections into the overflow passage. Then as the rubber shrinks in vulcanizing the sections of the flask will again come together, and there being but a narrow margin of plaster remaining immediately around the mold, the bearing of the springs is thrown upon this margin, and the rubber either yields to the pressure of the edge, or possibly the plaster yields to the pressure of the rubber. In any event the flask is closed much more perfectly than it would be closed by the method shown in Figure 1.

The amount of shrinkage varies in different samples of Dental Gums, as it depends upon the amount of extraneous matter which has been added, either as pigment or "filler", the latter being added by the manufacturer to control and diminish the shrinkage. In the case of the rubbers ordinarily used, it will vary from three to five per cent. A certain amount of the rubber is expelled from the mold into the overflow chamber when it is heated to the vulcanizing point, and the amount of this, again, varies according to the construction of the rubber, the percentages running from four and one-half to five and one-half per cent. The total deficiency then in the mold chamber, when the rubber is vulcanized in the ordinary way in the rigidly bolted flask, will vary from about seven and 6/10 to over ten per cent. Under these circumstances, it is not at all strange that there should be defects in the dentures so vulcanized. It is more remarkable that defects appear so seldom.

When a piece of rubber compound is vulcanized, the result is always a considerable reduction in the volume of the mass, and in order to secure results, which are free from defects, it is absolutely necessary that we begin the vulcanizing process with more rubber than the mold will contain when closed. The rubber must be molded into its proper shape while it is soft, and as it is vulcanized, the mold must be closed upon it to follow up its shrinkage in a way somewhat analogous to the molding

Fig. 2.

of a celluloid blank. The amount of surplus rubber in the mold should be at least five per cent, and it can be best controlled by using sheet metal props to prevent the complete closure of the flask; the amount of surplus rubber retained depending upon the thickness of the props used.

To determine the time at which shrinkage occurs, samples of rubber compound have been vulcanized at various times, from five minutes to the usual time for vulcanizing, and it has been ascertained that the shrinkage takes place more rapidly during the first half of the time for vulcanizing; there being but little change during the latter half; and in order to compensate for the shrinkage when an ordinary vulcanizer

is used, it will be necessary to vulcanize twice, once for about half the usual time for vulcanizing, with the sections of the flask held apart by the props, and again for the other half of the time with the props removed and spring pressure applied to close the flask and thus compensate for the shrinkage.

If a vulcanizer is used having a flask closing attachment, by means of which the flask can be closed at the pleasure of the operator and while the vulcanizing process is going on, a single vulcanization will suffice; the flask being gradually closed as vulcanizing proceeds.

The Vulcanizing Temperature.

When Dental Gum was first furnished to the profession, the directions for vulcanizing it called for 320° temperature, Fahr. for about two hours time. The use of the Mercury Bath Thermometer, and improved methods of constructing vulcanizers by which they could be made to remain steam tight, resulted in an unnoticed, but a considerable elevation of the vulcanizing temperature, the result being that the time of vulcanizing was diminished from two hours to one hour or even less.

The transmission of heat was impeded in two ways. A certain amount of air is always included in the vulcanizer when it is closed, and the mixture of air and steam, which results when the vulcanizer is heated, does not transmit heat as readily as does an atmosphere of pure steam; the result being a lowering of the indication of the thermometer of about 20°, and of the apparent temperature; while the real temperature is increased. This difficulty is overcome by opening the blow-off valve and permitting the escape of a certain amount of steam, which carries off the air with it.

The mercury bath itself, being a part of the cover of the vulcanizer, is only as hot as the exterior of the vulcanizer. Considerable heat is lost in its transmission thru the metal of the vulcanizer by radiation from the exposed surface, and by contact of the cold air, the result being another lowering of the indication of the thermometer. The transmission of heat thru the mercury bath is always imperfect and the indication of the thermometer from this cause alone is delayed 18° Fahr. or more; the flask and its contents being accordingly exposed to a considerably higher temperature than was contemplated in the directions for vulcanizing as originally given. While thin pieces of rubber may be vulcanized at 320° as shown by the mercury bath thermometer, it is questionable if the work is as well done as it would be at 320° actual temperature, as specified in the original directions. If the piece of rubber to be vulcanized is thick, say a quarter of an inch or more, it is very apt to come out spongy or porous, and it is recommended that the vulcanizing temperature should not exceed 300° by the mercury bath thermometer; 320° actual temperature; the time being increased to two hours, or thereabouts, from the time when the vulcanizing temperature is reached. For still thicker pieces the time should be increased and the temperature still further reduced. The product will then have more toughness, and if successive vulcanizations are necessary, more of them will be endured before the vulcanite will become so brittle as to need replacement.

When vulcanite is once well hardened it remains of very nearly the same density thereafter, and shrinks but very little if repeatedly vulcanized.

Expansion and Contraction of Vulcanite.

Vulcanite expands by heat and contracts by cooling more than any other solid substance, and this fact must be remembered; as irregular cooling of a vulcanite denture will be very apt to

produce warpage and result in a misfit. If it is slowly and regularly cooled it is held by its attachment to the plaster investment while cooling so that the plate retains its size and shape; as the vulcanite remains soft and cartilaginous until it has reached a temperature of about 130° Fahr. It then stiffens as the temperature lowers, but it has nearly reached the ordinary temperature of the room and its contraction during this small range of temperature cannot be avoided, and is not sufficient to call for notice. Better results will be attained if the flask and its contents are allowed to cool slowly; and it is also a question if it is not better to allow them to remain undisturbed for an hour or so after they reach the temperature of the room, for it is probable that a certain molecular change takes place in the vulcanite which is not completed until after a short time beyond the period of its cooling.

The adhesion of the vulcanite to the plaster investment has been mentioned above. This controls the manifestation of its shrinkage, as when this takes place the vulcanite separates from the smoother and more dense surfaces of the teeth and tooth-pins. As a consequence the tooth-pins are not firmly held in the vulcanite, nor are the teeth as well supported by it as they might be. This is the cause why the incisor teeth often loosen and start forwards, and why gaps appear between the teeth and vulcanite.

The contraction of the vulcanite in cooling is a factor to be reckoned with in another way. The denture should be kept under mechanical pressure after vulcanizing is completed and until it is thoroly cooled; and it is impossible to do this unless sufficient extra rubber is used to fully compensate for the shrinkage; and also to compensate for the contraction in cooling.

Good vulcanizing is a process which requires considerable care and judgment. The working qualities of different brands of dental gum vary considerably, and in their use the thickness of the denture to be produced must be taken into account, not only in order to ascertain the quantity of gum required to fill the mold, but also to enable the dentist to modify the temperature of vulcanizing if very much rubber is required. When the work is done in a hap-hazard way and without due consideration of all the circumstances, mishaps will occasionally occur and need not be wondered at. The only wonder is that they do not occur more frequently.

THE ROAD OF VISION IN ORTHODONTIA.

By J. A. Cameron Hoggan, D.D.S., Richmond, Virginia.

(Read before the National Dental Association at Its Twenty-third Annual Session, New Orleans, La., October 20-24, 1919.)

ANGLE, the Great, gave us normal occlusion as a point from which we could start to think of Orthodontia. Normal occlusion was the gift of a poet. He saw it, he felt it and gave it.

No doubt Angle compiled his poem. No one ever did better than compilation; but, he gave us order where we had chaos. He gave us a glimpse down his road of Vision. There are many by-paths along this road. Some of them are a part of this Orthodontic road; and some are misleading, blind alleys. But the road of Orthodontia is normal occlusion; and Angle's definition of normal occlusion can only be affected to the degree that analysis and vision opens up these by-paths or closes them.

We do not discard Darwin because he did not discover all the secrets of Evolution.

Normal Occlusion is our road, but is it our goal? If it is the goal we seek, then we fail miserably in our efforts to reach it. The man who deceives himself in assuming that he does, is much like the golf player, who continually looks for his ball fifty yards ahead of where he knows he has driven. Nature, herself, so seldom reaches this goal of normal occlusion, that when we discover it growing wild it is considered a masterpiece —but occasionally it is found.

Now, what of the average occlusion produced by nature unassisted? It is low. Our average, the Orthodontic average, is much higher. This fact, that we can produce, with the material in hand, a better occlusion than can Nature from a thousand cases, has a significant meaning. It must mean that the thing for which we are striving is not Normal Occlusion, but Function. The Function of various physiological forces, using material and power to get the most efficient machine from the arrangement of teeth and the relation of teeth to the individual. This effort is not solely a matter of making bone grow, stretching the jaw or the attainment of that elusive and very seductive normal occlusion. It is a question of what is the best to do with perverted and abnormal conditions, or what may be done with the pendulumic swing of variation, and that "Individual Normal" of which LeRoy Johnson gave us such a clear picture.

Some men have assumed that since it was easier, and one could get nearer a desirable function, by confining their efforts in Orthodontia to the period of tooth eruption, that this limited Orthodontic interference to a definite field, and they called it "legitimate field." But the poor we will have always with us, and we must treat them.

I believe all of you will admit that there is a relation of the teeth to each other, and a relation of the jaws to the head—a relation that defines Harmony. This harmony is noticeable and very attractive. Further, I believe you have noticed faces in which if you took the various features separately that they were good, but put them together and

they fail to please. The composition is bad. Such a face may have a very desirable occlusion of the teeth.

Figure 1.

Figure 2.

A mother comes to me and asks for an American chin, one of these Harrison Fisher affairs, put on a face such as Dana Gibson cannot help but draw. How great is the possibility of producing such an undesirable, inharmonious result! Is it possible to shape a jaw at will or is there some force that will drag an accomplished occlusion back to the form that was intended for the individual, that was laid down at the moment of fertilization, a biological plan? As a principle, I quite believe that we can

produce a development of the jaws that would be quite desirable in the jaw

Figure 3.

Figure 4.

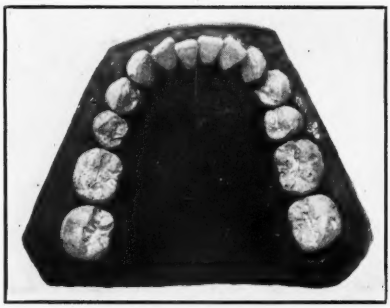


Figure 5 a.

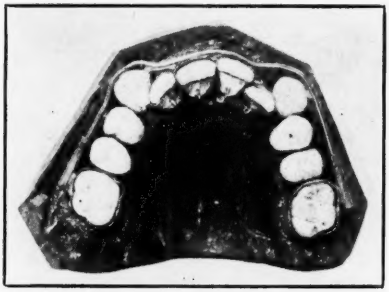


Figure 5 b.

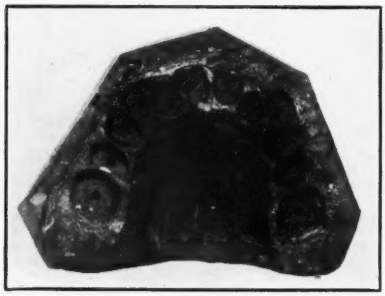


Figure 6.

shape and that it would remain so and yet be quite out of harmony with the rest of the face. That, while muscular function governs the position of the teeth and the shape of the jaws, we must come to the conclusion that the position of the teeth governs muscles and their action. Proof of this is *First,* that teeth will stay in all the million different forms of occlusion; *Second,* that they can be changed from these various positions; *Third,* that if we place our teeth in certain positions we will have definite forms and if we use our muscles in a certain way we will have corresponding development. The vision and work of Alfred P. Rogers in muscle control is a real principle of Orthodontia.

I repeat our goal is the most desirable function of the teeth, normal occlusion is our road. We can not

arrive at our goal, the most desirable function, by simply looking at models. Our eyes are not good enough. Some of them are blue.

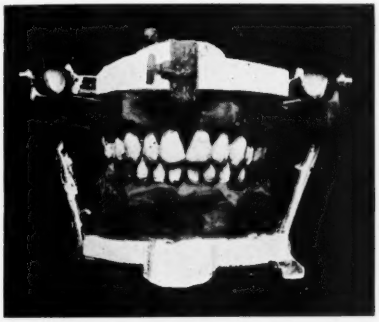


Figure 7 a.

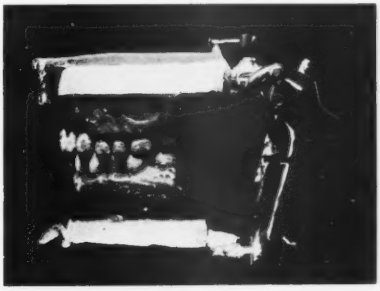


Figure 7 b.

C. W. Hawley and H. L. Staunton have measured teeth. Staunton measured certain portions of teeth very accurately and marks another principle in Orthodontia.

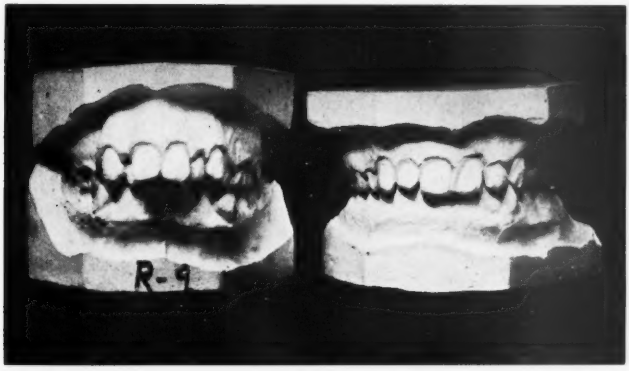


Figure 8 a.

I am now going to show you a simple method of measuring all planes of teeth:

1. An impression into which is pressed, with the fingers, some Dentalac or sealing wax, to get a model of each individual tooth crown. (Figure 1.)

2. It is then trimmed at the gingival line to get that portion of the tooth beneath the free margin of the gum, or the unexposed portion of the crown. (Figure 2.)

3. The models are cut off and placed back in the impression to measure the aggregate tooth material. (Figure 3.)

4. A piece of oval wire is heated and placed in the tooth form. (Figure 4.)

5. Softened impression compound is placed in the entire impression and around the forms, to obtain a base. (Figures 5 a and 5 b.)

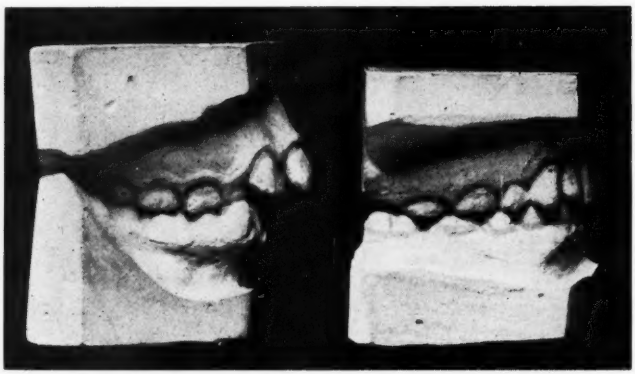


Figure 8 b.

6. The teeth are removed from the compound wax base. (Figure 6.)

7. The teeth are now arranged for study in the articulator and variations noted. (Figures 7 a and 7 b.)

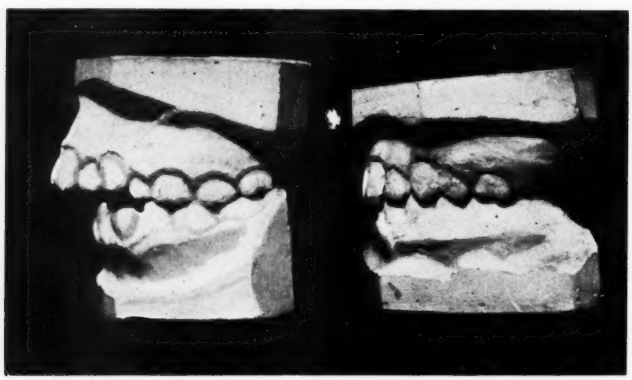


Figure 8 c.

8. Mutilated case with a history of previous orthodontic interference. (The left of Figures 8 a, 8 b and 8 c.

9. The right of figure 8 is the predetermined arch form of the most desirable relation of the incline planes—there are three teeth absent, two superior first bicuspids, and a lower incisor.

Some dentist falls heir thru his particular hobby to a brilliant idea. It is good. Something which adds to that sum of knowledge already known about the subject. Does he draw attention to his having mastered this problem, thru having a dental mind? That Dentistry has a road of vision? Rather he feels that in this discovery or expression of genius there is a greatness apart from dentistry, and had there been any possi-

bility of the great in his profession he would have shown it, since he has proven to his own satisfaction that he had a great mind. And so—he shoves dentistry in the back ground.

I knew of an ethnologist, a member of the faculty of a University, one of the greatest men of the country in ethnology. When he died, the University brought the attention of the profession to the fact that he was a dentist.

One of the greatest artists in this country at the present time practiced dentistry in Kansas at one time. Dentistry to him means simply an indiscretion of his youth. I would like to know how we may expect to attract the attention of great minds outside of the profession of Dentistry if we do not show that our road of vision is looking down that particular by-path upon which some greatness lurks. Why can we not become known as an authority on ancillery lines of our great work without subverting the identity of Dentistry. By such means we add to the principles of Orthodontia.

THE CALL OF ORTHODONTIA.

The clickity click and the clickity click,
  And the click of the latch as they come,
And the dear little faces in memory stick—
  The faces, the dirt and the gum.

The distorted mould of the human clay
  In a jumble of jaw and bone,
And the ruined hopes in a muscle play,
  Are they to be left alone?

The breath of the boy with his jokes and joys,
  Is the breath of the man who comes next;
And a shapely jaw, a voice and a poise,
  Is the gift of a "Golden Text."

The girl silken haired, starry eyed, and her pride
  In the tilt of her chin and her nose;
She walks down the aisle every day as a bride,
  And thinks only she and God knows.

And the gift of the Great in our old world it seems,
  Is the gift of emotions stirred,
So be you a part of children's bright dreams,
  And praise in their laughter heard.

And if we but hang on Memory's wall,
  A glistening smile in a face,
We have added to life the best gift of all—
  The happiness of a race.

DISCUSSION.

Harry E. Kelsey, Baltimore, Maryland.

The theory of the paper is new to me and most interesting.

I have seen something of Dr. Hoggan's method, and I think very highly of it. It is extremely ingenious. I have never tried it myself, but I think most highly of it.

Victor Hugo Jackson, New York, N. Y.

The use of similar tooth forms to those Doctor Hoggan has just described, separated from the model for study for determining on a plan for the re-arrangement of the teeth in the dental arch has, in a manner, been made and used for many years, but the accuracy attained by the Doctor's plan would seem to be an improvement.

I think he has given us some very excellent suggestions and an improved method in making models of individual teeth of the arch, first taking accurate impressions of the crowns with Dentallac and then filling the impression and shaping the plaster into full tooth forms, and assembling them on the model in the arch shape desired.

In general, with the exception of the supernumerary and impacted teeth, I do not believe that the extraction of teeth for Orthodontic purposes is often judicious or required, but in the re-shaping of the dental arch, it may in certain cases seem necessary or permissable.

In the case shown with the slide by the Doctor, the cuspids appeared prominent, but I think they should be moved outward and made more prominent to provide space for the proper arrangement of the incisors and other adjoining teeth. I was especially interested in the way the Doctor arranged the labio-buccal bar in this case. It seemed to rest on the buccal surface of the prominent cuspids and did not appear to be shaped to allow for the necessary out-

ward movement of the cuspids to permit space for the symmetrical arrangement of the incisors and cuspids with the other teeth of the arch.

Cuspid teeth often seem too prominent when, in fact, they need to be made more prominent to accommodate the four incisors in good line between them. This mistake is constantly being made, even tho one can by sight very readily determine where there is sufficient room between the cuspids for the incisors in good line. One should not forget that the operator looking the patient square in the face in examining irregular incisors and the position of the cuspids can usually determine instantly whether there is plenty of room between the two cuspids for the proper arrangement of the incisors. One does not often have to measure the teeth to determine this. In similar cases, I always insist upon there being plenty of room for and room to spare between the cuspids and between the four incisors before completing the correction of the irregular incisors and cuspids and retain them in spaced position for a long time.

I wish I could have had opportunity to examine the paper before speaking.

C. A. Hawley, Washington, D. C.

I think the method the essayist has described is one that has a great deal of future. It seems to me that his presentation of the paper does not go nearly as far as some of us want. There are many questions that have been disputed in the last few years that, to my mind, can be solved by this method. But the difficulty has been the technic.

I am in doubt, from the present presentation of the paper, whether it is possible with his method to get accurate re-production, for instance, of lower incisors and cuspids in malocclusion. It is exceedingly difficult to get impressions of those teeth and produce them accurately. Men have made statements in regard to forms of the arch that have not been proven. To my mind, Dr. Hoggan has a reasonable and possible way of solving that question which has not been solved by any other method.

J. A. Cameron Hoggan: I have not anything further to add to the discussion. It is primarily not a paper for discussion. It contains some suggestions in regard to ideals that I merely hope may be of some use in thinking along the lines of possibilities of orthodontia.

THE NECESSITY FOR PROPHYLAXIS AND RADIOLOGY IN THE PRACTICE OF ORTHODONTIA.

By F. M. Casto, M.D., D.D.S., Cleveland, Ohio.

(Read before the National Dental Association at Its Twenty-third Annual Session, New Orleans, La., October 20-24, 1919.)

THIS subject was selected because, first, I believe that the ultimate success of the Orthodontist is largely dependant upon how much importance he places upon the prophylactic care of his patients and how extensive he used the X-ray. Second, because I do not believe that the average Orthodontist is taking advantage of the fund of information at his disposal in either case. Third, because I wish to impress upon these men the great benefits to be derived from the safe and sane use of prophylaxis and radiology.

It is not necessary for me to dwell upon the necessity for the practice of periodontia. This has been established many, many years ago. The Periodontists have proved all their claims and I am certain that most every reputable practitioner of dentistry has been convinced, but I question whether every Orthodontist has been convinced of the necessity for prophylactic care during an orthodontic operation. If they have, then I am morally certain that many of them are not following out their convictions, notwithstanding the fact that there has been a great evolution the past decade with reference to it. Practically all appliances are constructed with that idea in view. There was a time, however, when appliances were constructed and placed in the mouth without much regard to cleanliness. In fact at one period within my memory it was the practice of some men to place clamp bands upon the teeth without cement. Thank Heavens those times have passed, and no man would now dare to place and leave an uncemented clamp band upon a tooth. Personally I have always been an advocate of prophylaxis. If I remember correctly, it was in 1901, while in the general practice of Dentistry, that my attention was severely called to the work by Dr. D. D. Smith, who presented a paper and clinic at a Dental Society Meeting in southern Ohio. His equipment, or as much of it as could be secured, was immediately installed in my office, so when I graduated into the practice of Orthodontia, thanks to my impression and practical experience, I continued to advocate and use prophylaxis. An assistant has been employed in my office for several years to do prophylaxis and every effort is made to keep the mouths of our patients clean and healthy.

When a patient reports for treatment, a careful examination is made of all mouth conditions, and the same properly recorded. This has special reference to cavities in the teeth, pulpless teeth, abscessed teeth, deposits upon the teeth, irritated and inflamed gums, diseased condition of any soft tissues, swollen glands, or any thing of that nature. The mouth is put into as near a healthy condition as possible before any orthodontic appliances are placed upon the teeth.

The patients who need fillings are referred to their regular dentist. He may also do the prophylaxis and treatment of the gums if he so desires, otherwise that is done by my assistant.

I endeavor to place all appliances so that they will interfere as little as possible with the functions of the mouth, to construct them as to cleanliness, and so the soft tissues will not be irritated by their use.

When bands are placed upon the teeth, they should be so fitted that the peridental tissues will not be injured. The Periodontists have warned against this, and have called attention to the permanent damage that may be done the peridental membrane when bands are forced too far gingivally upon the teeth. The bands should also be fitted with regard to protecting the teeth at points where any part of the appliance will come in contact. In many mouths disintegration of the enamel will occur when this is not done.

After bands have been cemented into place, care should be used to remove all excess particles of cement, especially should any be forced under the gum margin. If not, it might be the source of considerable irritation and unpleasantness for the patient. All roughened surfaces of the bands should be carefully burnished or removed by polishing. The molar and bicuspid bands should be contoured as near like the natural teeth as possible so the bolus of food will be deflected from the gums in mastication.

Upon each visit of the patient to the office, which will average about once in two weeks, the mouth, teeth, and appliances are carefully cleaned. This is accomplished by the use of a soft brush, or rubber cup, with powdered pumice, the liberal use of warm water, and the spray bottles. Those parts of the appliances that are removable, are cleaned in the laboratory.

Regular prophylactic treatments are advised about every six weeks, and the removal of all bands and appliances for this purpose about every six to eight months, with the exception of anterior bands, which are not necessary, except where there is some doubt as to the condition.

At the time prophylactic treatments are given, an examination of the teeth for cavities is made, and if any are found, they are marked on a chart, of which there are two copies. One is given the patient, with instructions to go to their dentist immediately, and the other is filed in the office for future reference.

During the entire orthodontic procedure the patients are instructed in the care of the mouth. and use of the tooth brush at home. By following out these methods the mouths of the patients are kept clean and healthy, permanent injuries to the peridental and soft tissues prevented, disintegration of the enamel reduced to a minimum, the early discovery of cavities assured, and many embarrassments to the orthodontist eliminated.

I would suggest that where a periodontist and orthodontist are not associated in the same office, that an arrangement be made between these specialists whereby the patients may receive the full benefits to be derived from such a combination. This I am certain would prove of mutual benefit to all concerned.

The thought has prevailed among certain of the profession and many of the laymen for some time that the appliances are responsible for every ill that may befall a child during an orthodontic operation. Physicians frequently arrive at a quick diagnosis when they observe appliances in the mouth. The orthodontists have been so intensely interested in the development and progress of orthodontia, that as a rule they have not taken heed of these accusations, and have not really taken the time to deny them. To those who are familiar with the progress and practice of modern orthodontia, comment is unnecessary. To those who are

not, may I say most emphatically such accusations are unfounded and untrue. Obviously I refer to those cases that are given proper orthodontic treatment and care by qualified men. Certainly great damage may be done in orthodontia, as well as periodontia, if the patients are treated by men who are not qualified to do so.

I have previously stated, and I wish now to reiterate it, that patients undergoing proper orthodontic treatment, suffer less nerve strain, have cleaner and healthier mouths, have less decay of the teeth, take better care of their mouths, and appreciate more the value of their teeth, than do patients who have not come under the care of an orthodontist.

To speak of the general use of the X-ray is redundant. You are already familiar with its value, and know its use to be indispensable. What I wish to do is to emphasize the necessity for its use in orthodontia.

From my observations I do not believe that the orthodontists in general are availing themselves of the use of the radiographs to the extent they should. This was formerly true of myself, but at present the radiograph is being used quite extensively in my office. I believed, as many did, that the only way to get satisfactory results, was to have the work done by a specialist in radiography. I still maintain that belief in certain complicated or obscure cases. However, the average case can be handled perfectly satisfactorily in your own office by a well trained technician, such a person may be a graduate dentist or not, as the case may be.

The modern dental X-ray apparatus has been developed to such an extent and has been so simplified, that the work of making the average radiograph is comparatively easy. I have found it advantageous to have the work done in my own office because, first, the patients usually prefer not to go elsewhere especially if quite young. Second. The orthodontist's time is conserved because frequently he will have to accompany the patient to the radiographer's in order that the correct views may be had. Third. The films can be developed before the patients leave the office and other views made if desirable or necessary. Fourth. The orthodontist becomes more familiar with the science of radiology and thus is better qualified to interpret the films. Fifth. Radiographs will be made more frequently because there is less inconvenience in doing so.

The object in speaking of these things is to encourage the more general use of the X-ray. Some men may find it more convenient and more to their liking to refer all cases to the radiographer. That is entirely a matter of choice. It doesn't make any difference, just so it is done.

For some time past I have made it a practice to make radiographs.

First. Of all patients applying for treatment, I consider a complete radiographic record in diagnosis as important as are the models and other data.

Second. Of children coming under my observation before any of the temporary teeth are lost.

Third. Of all unerupted teeth in completed cases.

Fourth. Of cases under treatment as frequently as deemed necessary

Fifth. Of cases that develop unusual symptoms at any time or where cavities are suspected.

Since installing the Dental X-ray, I have found it convenient to make numerous radiographs that otherwise might not have been done, and in so doing I must confess that many embarrassments have been avoided. It is perfectly amazing the number of interesting and unsuspected conditions that will be discovered, some of which would prove disastrous to the physical welfare of the patient and to the reputation of the orthodontist.

In order to impress more emphatically upon your mind the necessity for the

liberal use of the X-ray, I have selected the radiographs of several cases, and have made slides from them, which I will now display upon the screen and which I hope will be of interest to you.

DISCUSSION.

J. Lowe Young.

I have listened to this very interesting and timely paper and what I say will be in the nature of an amplification.

All practical orthodontists, I am sure, will agree that we require X-ray diagnosis before beginning treatment. This is necessary both from the standpoint of missing teeth and to show the positions of the unerupted teeth. For a considerable time I have been having radiographs of the lower jaw taken extra-orally. I find it far less annoying to the young patients than where the film is held down in the mouth. It also gives the third molar development and if direction is properly worked out, the position of the upper third molar as well can be quite definitely. I do not consider a case of malocclusion finished until the lower problem is definitely settled. I am sorry that I have not resorted to this practice years ago.

A. H. Ketcham, Denver, Colo.

This paper is very valuable; and while I cannot add anything to it, I can commend and try to accentuate the points of prophylactic care and also the importance of the X-ray in diagnosis. I feel that the orthodontist is responsible for the prophylactic condition of the patient's mouth while he is is treating cases of malocclusion.

A very valuable service rendered our patients is to teach them the proper procedure in brushing the teeth. My associates and I clean our patients' teeth thoroly at each visit; and, if they are not taking proper prophylactic care, our nurses drill them in tooth brush technic until they are proficient and acquire the tooth brush habit.

In regard to the X-ray. It is one of our most valuable aids in diagnosis, and should be used freely. In cases where there are temporary teeth present, the presence and position of the permanent teeth must be determined; pulpless teeth must also be checked up and the positions of the crowns of the third molars determined when they first begin to form.

Sometimes a case will apparently be finished; but, during the attempted eruption of the second or third molars, the anterior teeth will be forced out of alignment. An early X-ray diagnosis and removal of an impacted third molar, may save this relapse or sometimes a pulpless first molar may be removed and the second molar moved forward, liberating the impacted third.

In regard to missing teeth: A few years ago, I checked up missing teeth and found that about one out of ten of my little patients had one or more of the permanent teeth congenitally absent, and the one predominately absent was the lower second pre-molar.

W. C. Fisher, New York: I would like to ask Dr. Casto a question.

In the case of the removal of the temporary molar where he opened up the space, presumably to aid the surgeon to remove that molar, he found it necessary to remove the bicuspid immediately beneath. The question I would ask is,—what pathological conditions were found there necessitating the removal of the pre-molar. (Bicuspid.)

Harry E. Kelsey, Baltimore, Md.: I only wish to say in reference to the case of a boy which Dr. Casto showed in which the very early recognition of a cyst was disclosed by the X-ray and removed in time to obviate the necessity for losing any teeth, that, as he says, it came into my hands later on when his family moved to Baltimore, and neither at that time nor up to the present, about a year after the treatment

of his malocclusion has been completed, is there any visible evidence that such an operation had been performed, proving his contention that early recourse to the X-ray and other diagnostic methods would save many teeth and even large portions of the jaw.

S. S. Noble, Wichita, Kansas: I wish to endorse the use of the X-ray. Also I wish to say further to the men who have not purchased an X-ray machine that they obtain a machine that is just as convenient as the dental engine; not a machine that has to be placed in another room, but which shall stand behind your chair. You reach for the tube and adjust it to your patient as easily and conveniently and with as little waste of time as you would your dental engine.

I am not advertising anything. There are several machines that will do that very thing. They were recently constructed for that purpose, using the Coolidge dental tube for this kind of work. I feel, from experience, that it must be convenient without having to move your X-ray machine. Then you don't scare your little patients. You put it in position as easily or nearly so, as you do your dental engine. And then we use it as often as we want. Otherwise we will not use it as often as we wish to many times.

Julian Smith, Dallas, Texas: In the description of the case the doctor cited of the granulation disease. If he described the symptoms by which that disease could be recognized, I failed to get it. I think in a case that seems to be of as much importance in regard to unusual conditions as he recites there, that it would be valuable to us all if Dr. Casto could give us some of the symptomotology on this particular disease.

C. A. Hawley, Washington, D. C.: There is one case shown that is well worth while to take note of. That is the case in which a temporary tooth is discovered beneath the tissue. I think there are very few cases recorded of that kind. I happened to have a few in my practice. In one, an upper second deciduous second molar was buried completely beneath the gums. No signs of it whatever. In another case, there were four temporary molars buried completely. I have never seen any explanation of how such a condition could occur. I think it is very interesting and want to make a record of it.

F. M. Casto: In answer to Dr. Young would say that I use the extra-oral plates. In many cases they are a distinct advantage and should be used whenever it seems necessary. Dr. Fisher asked what pathological conditions were present which necessitated the removal of the second premolar in the case of the impacted second temporary molar.

There was no active pathological condition present, the teeth were encysted but the cyst had not developed enough to cause any trouble. The second premolar had to be removed on account of its relative position to the temporary molar. This was a case of Dr. Stephans. In his desire to save the permanent tooth, he did not remove either one, at the first operation but attempted to loosen the temporary molar and then wait a few days in the hope that the teeth might change positions, so the premolar could be saved. However, it was found at the subsequent operation that the teeth were still in such relative positions that the removal of both was necessary.

Dr. Fisher: Was there any ankylosis?

Dr. Casto: No, there was not. Dr. Smith asked a question regarding the symptoms of an Adamantomata. It develops insiduously and on account of it being located in the cancellated portion of the jaw does not cause much disturbance until it has advanced to quite a considerable degree.

It almost invariably starts in the molar region. The progressive symptoms

would be—tenderness in masticating, pulpitis, probable death of some pulps, swelling or enlargement of the bone around the affected part, tenderness on palpation, destruction of the cancellated bone, the tumor gradually extending in all directions.

Later the cortical layer of the bone will be attacked and broken down and a thick, heavy discharge will begin; usually this is emptied into the mouth, but sometimes the discharge is on the lower border of the jaw. The patient wili suffer systemic symptoms in accordance with the virulence of the attack. Diagnosis can only be verified by supplementing a pathological with a complete clinical examination.

I am glad to know that Dr. Ketcham has collected considerable data regarding the per cent of permanent teeth congenitally missing. In the cases he examined, which were, of course, more or less abnormal, he found about ten per cent to have congenitally missing teeth. This is quite significant. I might state in respect to Dr. Ketcham, that he really inspired me to use the X-ray so universally in my practice. He is one orthodontist who has constantly and persistently used the X-ray since he began the practice of orthodontia.

PRESIDENT'S ADDRESS.

By William A. Giffen. D. D. S., Detroit, Mich.

(Read before the National Society of Denture Prosthetists, 1919, at New Orleans, La.)

THE National Society of Denture Prosthetists is a going concern. It has no watered stock. Its members are all preferred stock holders. No person can prevent us from criticising the management. We cannot be frozen out. We may get out when we choose.

Membership in this Society is certainly a good business proposition for all members of the National Dental Association who are especially interested in Prosthetic Dentistry.

I believe we shall get the best returns in the way of condensed knowledge on Prosthetic Dentistry our chosen profession can produce at the minimum cost. I believe that an unprejudiced analysis of this meeting will prove that this society has enthusiasm and efficient energy to make it a potent factor for dental progress; that the progress the organization has made in its first year is about all that its members had a reasonable right to expect, but while the record of this society may be declared satisfactory and its future full of promise, the question is "How are we to utilize our forces in order to accomplish the greatest good."

Harmony is the most essential requirement, as internal dissension will wreck any institution, and the probabilities are that this society would not prove an exception to this general rule.

Another requirement which is just as important is efficient management of the society. In other words the members should interest themselves in the election of officers to the extent that they will vote for the election to office those men only who have a record for doing a good

deal of splendid work in their home state, and who have the endorsement of the officers and others who know the importance of the work to be done.

I would also add that there should be no hesitation in not re-electing or promoting an officer who has failed or neglected to fill to the best of his ability any position which he has agreed to fill by accepting a previous election.

This organization is bound to wield considerable influence for the future welfare of dentistry, but we must all pull together, as it is only thru association and a thoro filtering of ideas that we may acquire the executive ability as an organization that must be respected in order to accomplish the best results.

I would suggest that our next President divide the members of our society into Study Committees, and as our problems come up, refer them to the Study Committee best equipped to work out the problem. They would then demonstrate their findings to the other members of the society. Other problems could be worked out in the same way by other Study Committees: then when our annual meeting is held we would have a truly scientific program and each committee would be an important cog in this machine.

Study Committees would not only greatly benefit this organization by the results of their work, but they would afford opportunity to the individual members who would compose the committees to learn to practice the Golden Rule.

Again, we know that even mediocre ability when developed and well trained, will produce a larger tree of success than will extraordinary ability, scattered or uncared for.

It is what we do with what we have as much as what we have that counts in every line of accomplishment. Success in our case whether we possess great or little ability, consists in making the best of what we have, of doing our best with it, of reaching the highest within the range of our capacity. We can do more, we should do no less.

In following out these ideals, we shall soon accumulate a wealth of definite information and I feel certain that all contributions endorsed by this society will be gladly received by the parent society, the National Dental Association.

I wish at this time in behalf of this society to thank the officers of the National Dental Association and particularly Dr. Otto U. King, their Secretary, for the many kindnesses they have shown us during this first year of our organization. I trust that we shall always merit their confidence and respect.

I am proud to be able to call your attention to the fact that we shall present for your consideration at this meeting, some of the findings of three gentlemen covering a period of approximately 150 years of study. I refer to our honorary members, Drs. George Henry Wilson, James Leon Williams, and George Burwell Snow. Three of the greatest prosthetists the world has ever known.

In conclusion, I wish to thank the officers and members for their loyal support during my year as President, and hope that our relations will be just as cordial in the future as in the past.

WHAT WE EXPECT YOUR PAPER TO BE.

By C. J. Stansberry, D. D. S., Seattle, Wash.

(Read before the National Society of Denture Prosthetists, New Orleans, La.)

ONE evening, following one of our National Meetings, during an impromptu discussion, a "post mortem," it might be called on the papers of that day, the talk ran to criticism of the papers read, such as taking the meeting's time in presenting brief abstracts of well known facts presented in all texts on that subject, dealing with dead subjects or those far removed from general interest, presenting pet hobbies without the authority of experience or scientific foundations: and discussers who discussed nothing, ridiculed grammar or diction, or branched off into a paper of their own on their own interpretation of the given subject.

On that evening I was assigned by the chairman of our program committee to prepare a paper setting forth in a general way what a meeting of this kind has a right to expect from an essayist to whom we grant a hearing.

First of all have something worth saying, and a message worth while is worth saying well. The title is many times best written after the paper is finished in order that it may be comprehensive, set forth the character of the paper, and fix with definition the limits of the subject considered. Also make it attractive.

The first step in preparation is the construction of a definite framework upon which to build the body of the paper. The importance of making a complete outline will always be appreciated after it has once been done, as only by its use a proper logical order of setting forth your ideas can be assured. Under the outline first is the subject, then the principal ideas that suggest themselves should be set down as main topics and these main topics may then be divided into sub-topics. Arrange main topic and sub-topics in logical order. See that the ideas of the sub-topics are pertinent to the main topic under which it is placed. When outline is finished it should be studied to see that nothing irrelevant to the subject has been inserted nor anything relevant to it omitted. If the outline is properly made and faithfully followed few changes will be necessary. When details are once duly arranged under the different headings the tendency of the writer to repeat is corrected, correct sequence assured.

Clearness is of paramount importance and to attain it, unity, emphasis and coherence are essential. The first step toward unity, or the making of the paper a complete whole, is to follow closely within the limits of the subject. This subject should demand and receive a full complete explanation; that is make it a unit. The subject being selected do not deviate to topics that do not properly belong to it. If, for instance, the subject be technic of extraction do not dwell upon the loss of mastication when the extractions are done. We should challenge every idea that seeks admission to a paper by asking, "is this included within the bounds of our subject?" Emphasis requires that material be ar-

ranged with respect to position and space. Position emphasis demands that the most important ideas be put in the most important places. The conclusion of the paper is usually the most important position, the beginning the next in importance. Space emphasis requires that each idea should be given as much space as its importance warrants and no more. Coherence is the logical sequence of thought, a paper without coherence is like a forest without a trail, the writer's task is to blaze the trail. It is the connection of things with each other, the ability to go from point to point that makes a paper of interest. In the properly made outline lies the greatest aid to this normal sequence of ideas. A writer who attempts to write a paper without an outline is like a carpenter who attempts to build a modern building without the guidance of the architect's plans. Conclusion or summary; not all writers pay attention to this most important rounding out of the paper. Every scientific article should have properly drawn conclusions, and these conclusions should be the very essence of the paper convincingly stated. A paper should be as brief as possible without sacrificing facts, demanding only enough of the time and patience of the audience to permit the presentation of the essential points. A distinguished divine once asked President Hadley, of Yale, when about to deliver a sermon before the student body how long he should preach. The president replied: you can preach as long a sermon as you wish, but I have observed from long experience that no souls are saved after the first twenty minutes. The apology with which a paper is sometimes prefaced, that it is incomplete because the author had not sufficient time or opportunity to write it as he desired, is neither a credit to the writer himself nor a compliment to his audience. If the excuse be valid and one has not been able to complete the paper to his satisfaction in justice to himself and his hearers, he should defer its reading until it can be presented without flaw or apology. A paper that is worth reading at all is worthy of the best efforts that one can give it and no one should be satisfied to offer to his fellows anything except the results of his best endeavor. When the paper is finished, put it aside and do not touch it for a week or two. You will then look at it in a more critical way as the work of another and make appropriate corrections. Following this it may be submitted to the criticism of others, who should review it from the standpoint of material and diction. In writing such a well built paper you will re-read it in subsequent years without embarrassing memories and have the satisfaction of having performed a duty carefully, accurately and conscientiously. You will have contributed toward the sum total of dental knowledge and to the credit of the profession.

My conclusions are, "Have a live subject," "Use an outline." "Stick to it." Be complete, brief and logical.

THE PRINCIPLES OF BACTERIN (VACCINE) TREATMENT.

By Guthrie McConnell, M. D., Cleveland, Ohio.

The Research Institute of the National Dental Association, Cleveland, Ohio.

ALTHO the prevention of disease is the goal that is desired, many years will pass by before it is achieved. In the meanwhile a great part of the practitioner's time will have to be devoted to relieving those abnormal conditions that are constantly arising. We do what we can but if it were not for the agencies that are already present in the body, comparatively little would be accomplished. It is well known, however, that there are numerous bodily activities which altogether furnish a greater or less degree of what is called immunity. This immunity may manifest itself in various ways, according to the nature of the infection. All types of bacteria, after gaining entrance into the body, do not cause disturbances in the same way. Certain organisms, particularly those of diphtheria and of tetanus, produce typical soluble toxins which by their absorption cause serious disease. Others will form no toxin while living but after death they break down and set free various poisonous products which in turn affect the invaded individual. Some bacteria simply by sheer number may so overwhelm the body as to cause death.

As every infected person does not die there must be some form of natural protection. In many instances these protective substances will be found in the blood serum if the blood of an animal that has recovered from some infectious disease, such as diphtheria, be taken and allowed to stand, the cells will coagulate and settle to the bottom, leaving a clear serum. If this be taken and injected into an animal that has never had the disease we will find that it has become immune, it will not develop the disease if diphtheria bacilli are introduced into its body. Important as the serum is, its activities by no means constitute the only means of defense which the body possesses.

Many years ago, Metschnikoff came to the conclusion that the most important factor in the resistance to disease lay in the activities of certain cells of the blood, the polymorphonuclear leucocytes. Experiments since then have shown that a very definite course of events takes place when infection by various organisms, particularly staphylococci and streptococci, occurs. At first the changes are chiefly in the blood vessels but shortly it will be noticed that in the tissues where the bacteria lodge many leucocytes will be present. Further examination will show that, in many instances, bacteria will be found in the body of the cells. On account of this property, such leucocytes are known as phagocytes, this term referring to their ability to take up foreign substances. This activity depends upon the power they possess of independent activity similar to that of the ameba.

For a long time it was believed that this ability to engulf invading organisms depended entirely upon the activity of the leucocytes. That as a result of some

vital power, known as positive chemotaxis, the phagocyte was attracted to the invader. This force, it would seem, could act even thru the walls of the smaller blood vessels and cause the leucocytes to leave their normal surroundings. It was noted, however, that altho positive chemotaxis was the usual phenomena, there were times when the phagocytes seemed indifferent to certain bacteria. At one time it was thought that the leucocytes could take up dead bacteria only, and that was supposed to be the answer as to why organisms were not always found in the cell. It has been demonstrated many times that these phagocytes can take up living organisms and this explains some cases of secondary infections distant from the primary focus.

This belief that the activity of the leucocytes was the most important factor in the phenomena of phagocytosis was a very lasting one, but it has been shown that such is not the case. In 1903 Sir Almroth Wright demonstrated conclusively by some very interesting experiments that the phagocytes would not take up the bacteria unless the latter had been specially prepared. He showed that there existed in the blood serum certain substances that would act upon the bacteria and render them suitable for the leucocytes. These he called opsonins from the word "opsono," meaning "I prepare food for." A definition of them would be that they are substances present in both normal and immune serums which act upon bacteria, and other cells, in such a way as to prepare them for the attacking cell. It has been shown also that these opsonins are quite specific. In other words, one that will act upon colon bacilli will not be particularly active upon staphylococci. Consequently in order that the maximum effect be exerted in any special infection it will be necessary to increase the amount of opsonin for that specific organism.

Altho a certain amount of various opsonins is present normally, yet when infection actually occurs, more must be formed. This may take place as a result of increased cellular activity, particularly in the locality attacked, or the leucocytes themselves may be the source. Inasmuch as the presence of the bacteria stimulate the body to form these protective substances, advantage has been taken of this property and the vaccine treatment has resulted.

As is frequently the case when a new idea is advanced, too much has been expected of this method, and when satisfactory results have not been obtained the entire procedure has been thrown out as no good. Like everything else in the therapeutic line, it must be used with a clear understanding of its limitations. Many exaggerated claims as to its efficiency have been made in the past but at present a better understanding of its value exists.

The method depends upon the ability of dead cultures of bacteria when inoculated into the body, to stimulate the formation of opsonins. By so doing, the resisting powers of the individual are increased, the ability on the part of the bacteria to do harm is decreased, and the patient recovers.

Before taking up the preparation of the vaccine certain explanations are advisable. To begin with, the term "vaccine" is incorrect, but it has become so firmly established that it is difficult to avoid its use. This word was applied originally to the material obtained from a cow and used in vaccinating against small pox. The term is derived from "vacca," meaning cow. A more correct word is "bacterin." These preparations

are also not infrequently referred to as serums, which they are not, a fact which will be grasped readily when the method of preparation is described. No serum enters into their composition.

In actual use are two types of bacterins, the *stock* and the *antogenous*. In the latter the bacteria are obtained by the cultivation of the organisms present in the lesion of the infected person. The stock bacterin is made of bacteria similar to those in the infected individual but obtained from some other source. As a rule better results are obtained by using autogenous cultures, altho in some instances the use of stock bacterins is more satisfactory. Both types are made in the same manner.

Briefly described, the preparation is as follows: The bacterin consists primarily of a twenty-four hour old growth of a pure culture of the micro-organism on agar. This growth is then scraped off carefully so as to avoid, as far as possible, taking any of the culture medium along, and is then emulsified with physiological salt solution. This is then sterilized by heating in a water bath at 60°C for one hour and then diluting to the proper point. This is usually so done that one cc. will represent approximately the dose to be given. This dilution will vary, as the number of bacteria to a dose varies according to the organism used. After the dilutions are completed sterile culture tubes are inoculated with the bacterin and incubated for twenty-four hours to make sure that sterilization was complete. To further insure the sterility of the preparation, 0.5 per cent tricresol may be added.

In order to make the proper dilutions, it becomes necessary to determine the number of bacteria present in the original emulsion. Several methods may be used to estimate this but the most common one is that suggested by Wright. This consists of mixing one part of the bacterial suspension with an equal volume of normal blood and three volumes of physiological salt solution. After thoroly mixing, a smear is made upon a slide, the smear stained and the number of bacteria and corpuscles in successive fields of the microscope counted until at least two hundred corpuscles have been enumerated. As the number of corpuscles per cubic millimeter is 5,000,000, the number of bacteria per cubic centimeter can readily be determined. The suspension is then diluted so that there will be in one cubic centimeter the number of organisms desired for the initial dose.

Altho the dosage is measured supposedly by the number of bacteria present in the suspension, comparatively little attention is paid in clinical practice to that feature after the first injection has been given. In order to obtain the proper dose for a patient a small amount should be given at first. Then, if there is no reaction the amount should be increased gradually until the patient gives some local or general indication that the substance is having an effect. It is well to maintain this dose as long as the individual shows improvement. It should be remembered, therefore, that in this method the aim is not to give any definite number of bacteria, but to give a number sufficiently great to bring about the desired result.

In employing this method there are certain conditions necessary if success is to be expected. These are well summed up by McFarland.

1. The disease should be of subacute or chronic duration.
2. It should be fairly well localized.
3. It should be caused by a micro-

organism incapable of ready invasion or of much soluble toxin formation.

4. The micro-organism should be known and be capable of cultivation so that the appropriate specific vaccine can be made.

For some time there were numerous advocates of the use of bacterins during the acute stages of a disease. The majority, however, were opposed to this, and experience would indicate that the opposition was based on valid reasons. The stand taken is that when an individual shows general symptoms of an acute infection, his forces are evidently being called upon to respond as completely as possible. If such is the case, why add more bacterial products and in that way throw a greater burden upon the resisting forces of the body. It is in the subacute and chronic infections that the bacterins will be of the greatest value. In such cases there is not sufficient material escaping into the surrounding areas to stimulate the various tissues and cells to the full performance of their duty. By injecting subcutaneously the dead bacteria the rest of the body is called upon to take a hand and in that way overcome the local infection.

It should be remembered that during bacterin treatment other methods should not be neglected. Abscesses should be opened, wounds drained, foreign bodies removed and everything done that could in any way assist in building up the patient's resistance. If proper cases are selected this method will give very satisfactory results, but it is distinctly limited in its application and should not be considered as a cure all.

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DR. H. E. FRIESELL, PRESIDENT-ELECT OF THE NATIONAL DENTAL ASSOCIATION.

PRESIDENT-ELECT of the National Dental Association, Dr. H. E. Friesell, was born in Pittsburgh, Penn., Nov. 10, 1873. Dr. Friesell received his preliminary education in the public and high schools of Pittsburgh and later attended the University of Pittsburgh, then known as the Western University of Pennsylvania, graduating with the degree of Bachelor of Science. In 1892, he entered the Pennsylvania College of Dental Surgery, from which he graduated with the degree of Doctor of Dental Surgery.

After his graduation he located in Pittsburgh and began the practice of Dentistry. In 1903 he was elected to the faculty of the Dental School of the University of Pittsburgh, since which time he has served as Dean and Professor of Operative Dentistry. For ten years of this time he served also as Professor of Operative Dentistry and Dental Pathology at Western Reserve University of Cleveland, Ohio, resigning from this position in 1917 because of the growth of the Pittsburgh School which had steadily demanded more and more of his time.

Dr. Friesell has long been interested in dental literature and has one of the most complete dental libraries in existence. He served in an editorial capacity on the Dentists' Magazine, the Dental Summary and The Frater and as Chairman of the Tabulation Committee of the National Association of Dental Faculties for twelve years, the Dental Educational Council Committee on Curriculum for seven years, the National Dental Association Committee on Education for five years. In June, 1919, Marquette University conferred upon Dr. Friesell the honorary degree of Doctor of Laws.

He is a member and Past President of the Pennsylvania State Dental Society, National Association of Dental Faculties and The American Institute of Dental Teachers, also a member of several other state societies and of the American Medical Association.

Dr. Friesell is a 32nd degree Mason and a Past Master of Duquesne Lodge 546, F. and A. M. He is a member of the Delta Tau Delta Fraternity and President of the Pittsburgh Alumni Chapter of the same, also one of the oldest members of the Psi Omega Dental Fraternity, upon whose Supreme Council he has served continuously for twenty-five years.

During his earlier life, Dr. Friesell was an active participant in all kinds of athletic sports, holding many records in various activities and was recognized as the best all round athlete in Western Pennsylvania. He was captain of the Track Team of the Pittsburgh Athletic Club and for many years has been a member of the Athletic Committee of the University of Pittsburgh. Dr. Friesell is particularly fond of travel, especially by automobile, also of hunting, fishing and mountain climbing.

ROUTINE DENTAL DIAGNOSIS AS AN ADJUNCT TO MEDICAL PRACTICE.

By Ray R. Reed, D. D. S., Chief of Dental Department, Jones Clinic, Bay City, Michigan.

THE formerly quite separate professions of medicine and dentistry are today bound together thru great discoveries by men in each profession. More and more each day are we beginning to realize the important role mouth conditions play in the general health of the individual. To those who firmly believe in focal infection this article is merely intended as a corroboration of their ideas, but to the skeptics, I should like to start them thinking in positive rather than negative channels.

I wish to expostulate with you on a few principles incited by the following data. The outstanding principle is that of cooperation of the physician and dentist. By this, I do not mean merely the referring, by the physician of patients as last resorts, or patients with frouzy oral cavities. By cooperation I mean intimate connection resulting in routine dental examinations, such intimacy as is obtained in hospitals with dental surgeons on the staff, and in clinics with the dental department forming an integral part.

The following cases are unselected and are taken in the order of their appearance. The cases which are omitted are: those presenting themselves for dental treatment only; those with negative dental conditions; and those in which the patient has failed to finish dental treatment. It is to be kept in mind that teeth are extracted after due deliberation and consideration and for such reasons as: rarefaction visible in the X-ray; dead teeth showing no trouble in the X-ray; but suspicious of containing infection and having a bearing on the systemic condition; teeth which will not respond to pyorrhea treatment; teeth with exposed pulps; and teeth which will be a handicap to restorative work. (See table on next page.)

It is obvious that unless there is intimate cooperation between the medical and dental profession these results cannot be obtained. Routine examinations are quite necessary, both from the medical and from the dental point of view.

Case No. 650 brings out the importance of this practice. A patient entered with a complaint of gonorrhea. It was disregarded for the time being and he was given a general examination with the results that a heart lesion was discovered. On examination by the dentist, the mouth was found to be full of infection. Had the Neisser infection been treated singly, the other affection would not have been discovered. The successes of focal infection are obtained in this manner, the failures when diseases have manifested themselves in permanent pathological changes.

Case No. 742. The patient came in with a complaint of fractured leg. Thru routine examinations he was found to have a 4 plus Wassermann. Does this not prove the value of routine examinations for the medical profession also?

Case No. 680. A patient entered with a complaint of goitre and nervousness. This case illustrates another valuable point; that of cleaning up foci before operation. Granting that focal infec-

Case No.	Complaint	Diagnosis.	TREATMENT. Surgical.	Medical.	Dental.	Results.
6	Tumor of right ear, can't get breath.	Basal cell epithelioma, myocarditis, pulmonary fibrosis.	Removal of ear and plastic.	Digitalis, squills, and calomel (emergency medication).	Extraction of all teeth.	Marked improvement.
49	Throat trouble, pressure, nervousness, insomnia, headaches.	Impacted cuspids.			Impacted cuspids removed.	All symptoms removed.
50	Pain in right side of epigastrium and posterior pain in head.	Chronic cholecystitis.			Extraction advised of 10 teeth.	With the removal of 3 of the 10 teeth the symptoms in the head are improving markedly.
54	Pain in upper abdomen.	Chronic cholecystitis with stones in the common duct.	Operation.		Extraction advised of 6 teeth.	Following the operation, 4 teeth were extracted with additional improvement.
307	Rheumatism, aches and pains all over.	Focal rheumatism.			Extraction advised of 4 teeth.	Up to date 3 teeth have been extracted and the symptoms have practically subsided.
379	Pain in left arm, occasionally cannot get breath.	Adenoma of the thyroid (toxic), myocarditis.	Operation.		Extraction of 8 teeth, 1 week before operation.	Nervousness and associated myocarditis markedly improved.
454	Loss of appetite.	Focal rheumatism.		Palliative.	Extraction of 8 teeth and pyorrhea treated.	Too recent to report.
483	Sore feet.	Raynauds' disease.		Alteratives.	Extraction of 6 teeth.	Immediate partial improvement.
494	Stomach ulcers, numbness of hands, legs and feet.	Syphilis of stomach, mitral insufficiency.		Not yet begun.	Extraction of all teeth.	Condition stationary.
496	Heart trouble, nervousness.	Aortic insufficiency, retroversion.	Operation not necessary.		All uppers extracted except 2, and 3 lowers for reconstructive purposes.	Too recent to report.
502	Swollen left index finger.	Endarteritis of finger.			Extraction of upper bicuspid and pyorrhea treated.	Complete recovery.

Case No.	Complaint.	Diagnosis.	TREATMENT. Surgical.	Medical.	Dental.	Results.
505	High blood pressure, heart and kidney.	Focal infection, chronic cholecystitis, choleangitis.			Extraction of 1 tooth and treatment of pyorrhea.	Feels much better.
508	Goiter and heart.	Adenoma of the thyroid.	Thyroidectomy.		Extraction of all lower teeth before operation.	Marked improvement of general condition before operation. Rapid surgical recovery.
577	Rope sensation around the waist, pains in all parts of body. Treated elsewhere for lues.	Focal neuritis.			Extraction of 10 teeth.	Complete recovery.
587	Cramps and pains about umbilicus.	Diverticulitis.			Extraction of all teeth.	Pains relieved and gained 8 pounds in 3 weeks.
588	Periodical attacks of pain and stiff knee.	Chronic osteitis of left femur.			Pyorrhea treated.	Temporary improvement.
600	Pain in left abdomen, backaches.	Lues III, multiple advanced organic diseases.		Neo-salvarsan started.	Extraction of 4 teeth.	Improvement.
602	Spasmodic asthma, losing weight.	Tumor of abdomen.			Extraction of all uppers and 1 lower.	Great improvement.
603	Pain in sacrum.	Internal hemorrhoids, anal fistulae.	Operation.		Extraction of 1 tooth.	Improving.
632	Dizziness, headaches.	Teeth as foci.		Palliative.	Extraction of 3 teeth with an upper molar revealing an infected antrum.	Not heard from.
637	Sore on leg.	Ulcer of left leg, varicose veins and focal.			All teeth extracted.	Complete recovery.
639	Abscessed foot, bad taste in mouth, indigestion.	Abscess of foot lues III.	Incision of foot.	Neo-salvarsan.	All teeth extracted.	Appetite improved and bad taste relieved.

Case No.	Complaint	Diagnosis.	TREATMENT.			Results.
			Surgical.	Medical.	Dental.	
643	Pain in chest.	Aneurism of the aorta, lues III.		Neo-salvarsan started.	Extraction of all lowers and 3 uppers.	Immediate relief of pains after injection of salvarsan, and extraction of badly abscessed bridge.
648	Growth and enlargement of uterus.	Uterine polyp, advanced heart lesion.	Operation.		Two teeth extracted before operation.	Too recent to report.
649	Pain in abdomen.	Chronic cholecystitis, ventral hernia.	Operation.		Severe case of pyorrhea not treated.	Recovery complete but delayed.
650	Gonorrhea.	Posterior urethritis, beginning mitral insufficiency.	Incision on both sides exposing the vas deferens.	Injection of 1% protargol into vas on each side.	Six teeth extracted and pyorrhea treated.	Surgical recovery and general improvement.
654	Stomach trouble, loss of appetite, neuralgia, cold feet, hot face.	Chronic cholecystitis, chronic appendicitis.	Operation.		Extraction of 1 tooth.	Surgical recovery, constitutional improvement.
668	Pain in back.	Focal rheumatism.			All teeth extracted.	Not heard from.
680	Goitre, nervousness.	Toxic adenoma of thyroid, myocarditis, and aortic insufficiency, chronic cholecystitis.		Hospital observation.	Five teeth extracted, pyorrhea treated.	Goitre diminished in size, all symptoms improved markedly.
702	Pain under right clavicle and cough.	Pulmonary fibrosis.		Palliative.	Extraction of all teeth.	Condition stationary. Pains relieved temporarily.
716	Stomach, nervous.	Ulcer of stomach, chronic cholecystitis with stones in common duct.	Resection of stomach for ulcer with possible beginning carcinoma. Cholecystectomy for atrophic gall bladder.		All teeth extracted before operation.	Felt much better and gained in weight before operation.
725	Pain in back at night for past 9 years.	Focal rheumatism, right inguinal hernia, Neisser infection.	Right inguinal herniotomy.	Injection of 6 c.c. 1% protargol in vas.	Extraction of 2 teeth preceeding above operation and treatment.	Complete removal of pains.
742	Fractured leg.	Impacted fracture of os calcis, lues.			Advised extraction of all teeth.	Treatment not begun.
767	Pregnancy.	Pregnancy and lues.		Neo-salvarsan begun.	Prophylaxis.	Prophylaxis as preventive against possible nephritis.

tion is the cause of many of the ailments, is it not logical to remove the cause before the symptoms are treated? By the extraction of diseased teeth and treating of pyorrhea the goiter was diminished in size, the associated myocarditis and nervousness diminished, and the systolic blood pressure dropped from 170 to 132.

It is not always necessary to treat the symptoms in cases where disease has not manifested itself into a permanent lesion. In cases such as No. 725 the patient had a complaint of nocturnal pains in his back for the past 9 years. The teeth, which are shown in Figures 1 and 2, were extracted and the patient given a month in which to expect subsidence of symptoms. Three days later, on December 25, 1919, the patient appeared saying that the pains were relieved the first day. They have not recurred.

Figure 1.

This tooth was extracted, after due deliberation, on account of its being a devitalized tooth. The root-canal is apparently well filled, and an ill fitting crown was causing some irritation to the surrounding tissues.

Figure 2.

At the roots of this tooth may be seen an ordinary amount of rarefaction. This should make us suspicious of any similar condition, no matter how small it may appear. The canals are poorly filled, yet this does, by no means, prove that a well filled canal limits the chance of subsequent apical infection.

This series of 34 cases occurred between October 23, 1919, and January 6, 1920. All but two of these cases have been heard from, 6 are classified as too recent to report. Of the remaining 24, 6 showed slight improvement, 12 marked improvement, and 8 symptomatic recovery.

Do not results like the above secure focal infection on a firm foundation immovable by the storms of "criticism?" Like in any other profession or any enterprise one must at certain times use his head. Be conservative in the promises you make. It is our duty to teach physicians, sending us cases, the value of early dental examination which should be collateral with the general physical examination. In such a manner is focal infection to become something tangible and not pass into oblivion as a theoretical fancy?

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Editorial Department.

AN UNFORTUNATE TERM.

It is a very great misfortune that the term "dead teeth" was ever given to teeth that have lost their pulps. A tooth is not dead simply because the pulp has been removed. Attention has been called to this fact repeatedly, and yet the term sticks, and it has been accountable for much damage. The impression created in the minds of the medical profession by the term "dead teeth" has doubtless led to an unwarranted prejudice against these organs and to a wholesale condemnation of them which has resulted in the loss of very many useful organs. The natural reasoning is that a thing that is "dead" is not safe to leave in the mouth and this reasoning is carried on to the patient with the result that the

moment "dead teeth" are talked about the patient begins to feel uncomfortable if he has any in his mouth. Many teeth—countless numbers of them—have thus been extracted "on suspicion." The evil has grown to such proportions that it is time the attention of the medical profession and of certain members of the dental profession who still persist in using this term, was very strongly called to the faulty nomenclature. That it is faulty there is no question.

If the members of either profession are disposed to contend that a tooth is dead because it has lost its pulp let them study two classical presentations on this subject—one by Dr. Harold Box, of Toronto, Canada, before the meeting at New Orleans last October, and the other by Dr. F. B. Noyes, of Chicago, before the recent meeting of the Illinois State Dental Society. These pronouncements disprove once and for all time the statement that a pulpless tooth is necessarily a dead tooth, and the sooner this term is eliminated from our literature and the literature of medicine, the better it will be for our patients.

Reasoning from analogy, it seems strange that this phrase should have gained such a foothold. Manifestly anything that is "dead" will not be tolerated in the mouth, and we know from long clinical observation that pulpless teeth have been retained in the mouth in countless numbers for many years.

If the proper name had always been given these teeth it is safe to assume that a different attitude of thought would have been maintained toward them. They would not have been accused of creating all the ills to which human flesh is heir, and they would have been examined in a more impartial light than they have.

Other terms, intended to mitigate the evil effects of the phrase "dead teeth," are nearly as bad and misleading in their meaning. Such, for instance, are the terms "devitalized teeth," or "devital teeth." All are equally erroneous, and all should be eliminated from our nomenclature. Let us be exact and accurate in our statements, and then we shall have a better understanding of what we are talking and writing about, and we shall also convey a better understanding to others.

When we refer to a tooth that has lost its pulp let us say "pulpless tooth," instead of "dead tooth," or "devitalized tooth," or "devital tooth," etc. When we make an application to destroy the pulp, let us not say that we are "devitalizing the tooth," but that we are "devitalizing or destroying the pulp." We cannot expect the medical profession to be accurate in the use of dental terms unless we are accurate ourselves, and we cannot look for accuracy in thinking without employing accuracy in statement. The profession as a whole should get behind this reform in nomenclature, to the end that the pernicious term "dead teeth" shall be driven from our literature, never to return.

SPECIAL MESSAGE ON LEGISLATION.

A PROPOSED EXCISE TAX OF $10 PER OUNCE ON GOLD.

By Homer C. Brown, D. D. S., Columbus, Ohio.
Chairman Legislative Committee, N. D. A.

Congressman Louis T. McFadden, of Canton, Pa., recently introduced in Congress a bill known as H. R. 13201, providing for an excise tax of $10 per ounce on all gold, except that used for monetary purposes and for some limited dental purposes, such as Governmental and free clinic uses, and also for corrective and restorative dental work for children under 15 years.

This legislation is sponsored by the American Mining Congress and is supposed to be approved, if not strongly supported, by the banking interests of the country. Its alleged purpose is to stimulate an increased gold production, and there may be some very good arguments for offering some additional incentive to the gold mining industry, in order to produce the required amount of this very important and necessary metal. This tax is to be distributed as a premium or a bonus to the producers of new gold on a basis of $10 for each ounce mined. However, unless all gold used in any way to correct physical defects is exempted from the provisions of this bill, the destructive results, both from a humanitarian and an economic standpoint, will be so far reaching as to more than counter-balance any constructive benefits wherein economics and the mining industry are only considered.

The teeth rank first and the eyes usually second in any classification of physical defects. The importance and necessity of correcting defective vision has long been recognized, but in only recent years has the importance of neglected mouth conditions, as a positive contributing factor in disease, been generally recognized. As a result, many industrial institutions are recognizing the individual unit as an asset and have established both medical and dental clinics in order to conserve health, promote efficiency and increase production. Therefore, if Congress enacts legislation which will in any way tend to restrict the benefits accruing from the correction of such dental and eye defects the far reaching influence, in the final analysis, will be destructive rather than constructive. The correction of these defects is fundamentally a constructive service and can not in any sense be considered as a luxury. Thus the best interest of society, in its broadest sense, will be served by recognizing the merit of such an exemption and this will also tend to stimulate an increased interest in health conservation.

Another very objectionable bill is pending in Congress, introduced by Congressman Isaac Bacharach, of Atlantic City, N. J., and known as H. R. 7785. This bill provides for a greatly increased duty on surgical and dental instruments, and it passed the House August 2, 1919. The Senate Finance Committee reported this to the Senate March 2, 1920, without amendments. All such added expense becomes a fixed overhead and must naturally be

distributed to a long suffering public, whose burdens are already sufficiently oppressive. Therefore, this becomes more than a dentist's problem, and protests from the public would be voiced if fully advised of the situation.

In view of the foregoing, I urgently request that each reader promptly write his Congressman, emphasizing the importance of exempting from the provisions of H. R. 13201 all gold used in any way to correct physical defects. Also, promptly write his Senators requesting them to oppose the increased duty on surgical and dental instruments. Then discuss this proposed legislation with some of your influential patients and secure their cooperation.

H. R. 13201 is before the Ways and Means Committee of the House of Representatives and I append hereto a full list of the personnel of said committee. It is especially important that these committeemen be communicated with and the officers of any dental organization will be fully justified in promptly speaking for their members, since time is an important factor.

Ways and Means Committee.

Joseph W. Fordney, Chairman, Michigan.
J. Hampton Moore, Pennsylvania.
William R. Green, Iowa.
Nicholas Longworth, Ohio.
Willis C. Hawley, Oregon.
Allen T. Treadway, Massachusetts.
Ira C. Copley, Illinois.
Luther W. Mott, New York.
George M. Young, North Dakota.
James A. Frear, Wisconsin.
John Q. Tilson, Connecticut.
Isaac Bacharach, New Jersey.
Lindley H. Hadley, Washington.
Charles B. Timberlake, Colorado.
George M. Bowers, West Virginia.
Claude Kitchin, North Carolina.
Henry T. Rainey, Illinois.
Cordell Hull, Tennessee.
John H. Garner, Texas.
James S. Collier, Mississippi.
Clement C. Dickinson, Missouri.
William A. Oldfield, Arkansas.
Charles R. Crisp, Georgia.
John F. Carew, New York.
Whitmell P. Martin, Louisiana.

609 Hartman Building, April 19, 1920.

THE NATIONAL RESEARCH COUNCIL.

The Carnegie Corporation of New York has announced its purpose to give $5,000,000 for the use of the National Academy of Sciences and the National Research Council. It is understood that a portion of the money will be used to erect in Washington a home of suitable architectural dignity for the two beneficiary organizations. The remainder will be placed in the hands of the Academy, which enjoys a federal charter, to be used as a permanent endowment for the National Research Council. This impressive gift is a fitting supplement to Mr. Carnegie's great contributions to science and industry.

The Council is a democratic organization based upon some forty of the great scientific and engineering societies of the country, which elect delegates to its constituent Divisions. It is not supported or controlled by the government, differing in this respect from other similar organizations established since the beginning of the war in England, Italy, Japan, Canada, and Australia. It intends, if possible to achieve in a democracy and by democratic methods the great scientific results which the Germans achieved by autocratic methods in an autocracy while avoiding the obnoxious features of the autocratic regime.

The Council was organized in 1916 as a measure of national preparedness and its efforts during the war were mostly confined to assisting the government in the solution of pressing war-time problems involving scientific investigation. Reorganized since the war on a peace-time footing, it is now attempting to stimulate and promote scientific research in agriculture, medicine, and industry, and in every field of pure science. The war afforded a convincing demonstration of the dependence of modern nations upon scientific achievement, and nothing is more certain than that the United States will ultimately fall behind in its competition with the other great peoples of the world unless there be persistent and energetic effort expended to foster scientific discovery.

(From the Secretary's Office,
1201 Sixteenth Street, Washington, D. C.)

PHYSICAL EDUCATION IN THE UNITED STATES.

By Arthur L. Drew
National Physical Education Service.

Popular interest in the movement for physical education is growing thruout the United States according to reports received by the National Physical Education Service, which has headquarters in Washington, D. C. In Georgia, Kentucky, Louisiana, Mississippi and Virginia, campaigns are under way in each of those commonwealths. The U. S. Public Health Service and the U. S.

Bureau of Education, thru their respective heads, Surgeon-General Rupert Blue and Commissioner P. P. Claxton, have emphasized the importance of the physical education movement in this country, and the support of these two officials will do much to bring success.

Thus far, thirteen states have passed compulsary physical education legislation. There is also a movement afoot to have congress pass a measure thru which the states will be assisted in their efforts to raise physical standards of school children. This proposed law, which has been prepared by the National Physical Education Service, would help states to train and pay supervisors and teachers, including medical examiners and school nurses. For this purpose the bill would have congress make a preliminary appropriation of $10,000,000 to be allotted among the states for expenditure under local direction of states which appropriate equal sums and make provision for well-rounded physical education programmes for all children.

In Kentucky, the State Board of Health and the Child Labor Association recommend that physical education and health protection of children should be developed thru a new bureau in the State Department of Education. The Board of Health and Child Labor Association favor legislation such as is recommended by the U. S. Bureau of Education and the National Committee on Physical Education, out of which bodies grew the National Physical Education Service. Surveys made in Kentucky show the immediate need of physical education of school children. Physical defects are found in a large proportion of the boys and girls examined, particularly in the rural sections. Neglect of the teeth is responsible for a great many of these defects, the Board of Health pointed out.

Thruout Mississippi, a state branch of the National Physical Education Service is hard at work. Leading educators, lawyers, and public-spirited citizens and numerous organizations, with great influence in the state, are cooperating with the Mississippi Committee.

In Virginia, the National Physical Education Service is working with the Education Commission, appointed by Governor Westmoreland Davis, the State Board of Health, and the Cooperative Education Association. The Education Commission has just recommended that each superintendency division of Virginia employ the services of a school nurse or school physician for full time. The reason for this recommendation is to be found in the physical condition of Virginia school children. The State Board of Health called for an inspection of students a few weeks ago. The readers of The Journal of the National Dental Association will note that almost half of the total number of children examined were found to be suffering from defective teeth. Principals of 316 schools sent in reports and 18,456 children were examined. The number of children with defective vision was 4,333, or 23.4% of the total. The number of children with defective hearing was 1,198, or 6.5% of the total. The number of children with defective teeth was 8,820, or 43.3% of the total. The number of children with poor nutrition was 1,451, or 6.18% of the total.

Examinations made in recent years in this state all go to prove that the figures given out by the State Board of Health in this connection are quite conservative and that some counties would report worse conditions if exhaustive surveys were to be made.

INDUSTRIAL DENTISTRY.

By Dr. Louis P. Cardwell.

"Industrial dentistry" is a comparatively new effort to improve efficiency in the world of labor which is fast proving its great value to both employer and employes.

It is not a charitable proposition forced

on the employe by a paternal employer. On the contrary, it is a business proposition of immense value equally to the man who furnishes the cash for the pay roll and the man who supplies the labor for the product.

The Armour plant requires its dentist to devote all his time to the employes, take care of all emergencies, stop all toothache, extract all teeth necessary, have X-ray pictures taken for diagnosis, examine and advise in every case and last but not least, thoroly clean teeth and put the mouth in a clean, healthy condition.

Further, the dentist explains in detail all that pertains to a case in language clearly understood by the patient so that when he presents himself to his own dentist for fillings, crowns, bridges or plates, he is thoroly informed on the requirements of his case and just about what it is going to cost him.

The patient presents a clean, healthy mouth for his own dentist to work in and the dentist, realizing that his patient appreciates the necessity and value of the work to be done, approaches his task in a much more sympathetic frame of mind, than is the case where he has to do all the explaining himself and at the same time sell a bill of dentistry to the prospective patient, with a mouthful of bad teeth that are painful, diseased and very often foul with heavy deposits of tartar.

During the past two years, more than four thousand individual cases have been cared for by the dental department. Every patient has been told the particular requirements for his or her case, the best way to correct conditions and how to take care of the teeth in the future.

This explanation is not a lot of set phrases. If that was all required, we could install a phonograph and let it go at that. In each case attention is given the particular trouble and the appropriate instructions given and repeated again and again.

Thru the columns of plant newspapers from time to time, we have articles pertaining to dental troubles and endeavor in a general way to inform the readers upon dental subjects.

COMMUNICATION FROM EDWARD PITTWOOD.

Spokane, Wash., April 2, 1920.

Otto U. King, D. D. S.,
127 N. Dearborn St.,
Chicago, Ill.

Dear Doctor:—I am sending you under separate cover, copy of the Spokesman-Review, published in this city. I was so impressed with your editorial on the slaughter of teeth, that I took The Journal of the National Dental Association to the editor of this paper for publication. He was so impressed with the article that he published it and requested me in the future to bring any good stuff for publication.

The people of this section of the country are in the hands of the fakers. In fact, I believe there is more advertising done by dentists in the Northwest than in any section in the United States. I believe the dental journals should start a campaign with articles showing up the advertisers' methods and then have these articles copied by newspapers thruout the country.

I believe that the dental profession owes the people the wonderful protection they can give thru publication. Ethics means morality and if the better class of dentists sit idly by and allow 80% of the people to be deceived, health injured, personal appearance and comforts of life enjoyed by having the mouth kept in proper condition, then we, as dentists, are immoral and falsely sailing under the banner of ethics. We are constantly trying to secure the legislation to protect the public and in a measure we do,

but the most vital point confronting us today, is properly instructing the public.

This to my mind is the most paramount issue confronting us as a profession pertaining to our greatest duty to mankind. The public needs to know more about the mechanical restorations and the principles involved in its construction, "the Why's and Wherefore."

We have been trying to educate the profession, but in that we only succeeded with a small percentage to attain the highest standard of dental operations. Too many dentists, altho they belong to dental societies, are ignorant, shiftless and poverty stricken and are forced to live in neighborhoods where a poor class of people dwell. Therefore their environments and personality are of such a character that they can only attract that class of people for patrons and are forced to work cheap and do their operations accordingly.

Fraternally yours,
EDWARD PITTWOOD, D. D. S.,
503 Hyde Bldg., Spokane, Wash.

NEW AND MORE LIBERAL BENEFITS FOR EX-SERVICE MEN AND THEIR RELATIVES AND BENEFICIARIES.

Effective December 24, 1919.

Under the new Amendment to the War Risk Insurance Act., which has been passed by Congress and which became a law on December 24, 1919, when it was signed by the President, war term insurance or United States Government life (converted) insurance policies may be made payable to any of the following list of beneficiaries:

Parent, grand-parent, step-parent, parent thru adoption, wife or husband, child, grand-child, step-child, adopted child, brother, sister, half-brother, half-sister, brother thru adoption, sister thru adoption, step-brother, step-sister, uncle, aunt, nephew, niece, brother-in-law, sister-in-law, a person who has stood in the relation of a parent to the insured for a period of one year or more prior to the insured's enlistment or induction, the children of such person; parent, grandparent, step-parent or parent thru adoption of the insured's wife or husband.

United States Government life (converted) insurance may now be paid at death in a lump sum or in installments for 36 months or more, at the option of the insured.

The rate of compensation for disability has been greatly increased. A comparison between the amounts formerly granted under the War Risk Insurance Act with those provided by the new law follows:

Temporary Total Disability.

	W. R. I. Act	As Amended
With neither wife nor child	$30	$ 80
With wife but no child	45	90
With wife and one child	55	95
With wife and two children	65	100
With wife and three or more children	75	100
With no wife but one child	40	90
With no wife but two children	50	95
With no wife but three children	60	100
*With no wife but four children	60	105
Extra allowance for dependent mother or dependent father or both	10 each	10 each

Total and Permanent Disability.

Under the War Risk Insurance Act the same scale applied for total and permanent disability as for temporary total disa-

*Under the new law there is an allowance to a man temporarily totally disabled, and with no wife living, of $5 additional for each child (in excess of one) without limit as to number.

	As Amended
bility. A distinction is made between the two in the new law. Under the latter the compensation monthly for total and permanent disability is	$100
Note: (a) Under the new amendment if the disabled person is so helpless as to be in constant need of a nurse or attendant, an additional allowance is provided, in the discretion of the Director, not exceeding	20
Under the W. R. I Act the same provision was effective, except that a man receiving $100 per month (as outlined in (b) below) could not be given an additional allowance.	
	W. R. I. Act
(b) Both under the W. R. I. Act and under the new law, compensation for the loss of **both feet or both hands or the **sight of both eyes**, or for **becoming helpless and permanently** bedridden is	$100 $100
In addition, the new law provides that compensation for the **loss of one foot and one hand, or one foot and the sight of one eye, or one hand and the sight of one eye**, shall be	100
(c) The new law provides that for **double, total, permanent disability** the rate of compensation shall be	200

Partial Disability.

The new law provides:

"If and while the disability is rated as **partial** and **temporary**, the monthly compensation shall be a percentage of the compensation that would be payable for * * total and temporary disability, equal to the degree of the reduction in earning capacity resulting from the disability * *."

"If and while the disability is rated as **partial** and **permanent**, the monthly compensation shall be a percentage of the compensation that would be payable for * * total and permanent disability equal to the degree of the reduction in earning capacity resulting from the disability * *."

Note: In no case is compensation payable for a reduction in earning capacity rated at less than 10 per cent.

TREASURY DEPARTMENT,
Bureau of War Risk Insurance.
LNR-202A. 12-29-19

**The new law provides that each of the impairments mentioned in (b) shall be deemed to be total, permanent disability.

REINSTATE YOUR LAPSED U. S. INSURANCE.

Discharged Service Men may reinstate their lapsed yearly renewable term insurance at any time before July 1, 1920, without regard to the date the insurance lapsed or the date of discharge from the service. The discharged man in his application for reinstatement must state that he is in as good health as at the time of his discharge or at the expiration of the grace period, whichever is the later date, and must send with the application a payment covering two monthly premiums, one to cover the grace period, one for the month of reinstatement.

This ruling of the Director of the Bureau of War Risk Insurance abrogates all previous decisions. The American Red Cross urges all discharged service men to take advantage of this new opportunity to reinstate their insurance because of the liberal features which are now included under the authorization of the Sweet Bill.

DENTAL CORPS ORDERS FROM WAR DEPARTMENT.

DENTAL CORPS.

Maj. Arthur J. Hart to Charleston, S. C., and report to retiring board for examination.

First Lieut. Walter D. Love to Omaha, Nebr., Army baloon school, for duty.

First Lieut. Raymond S. George to Fort Riley, Kans., for duty.

—*Army and Navy Register, March 27.*

Col. Frank H. Wolven report to retiring board at San Francisco for examination.

Lieut. Col. Thomas L. Smith is honorably discharged as lieutenant colonel only.

Maj. J. Craig King, having been found by an Army retiring board incapacitated for active service on account of physical disability incident thereto, His retirement from active service is announced; proceed home.

Resignations by Capt. Neil J. McCollum, First Lieuts. Harold A. Curtis, James A. Curtis, Jr., accepted.

Capts. Benjamin C. Coombe, Robert W. Parrish, First Lieut. Leard M. Bowman, honorably discharged.

—*Army and Navy Register, April 10.*

NATIONAL DENTAL GOLF ASSOCIATION.

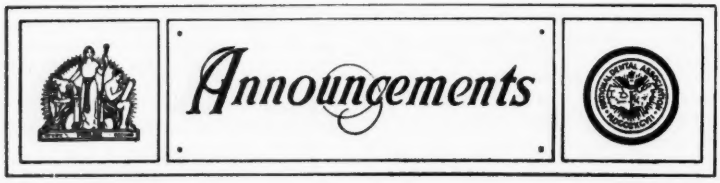
Application for Membership.

Name .....

Address .....

Fee $3.00 paid but once.
Club Handicap.
Any member of National Dental Association is eligible.
Please fill out application and send to
DR. RALSTON LEWIS, 25 E. Washington St., Chicago, Ill.

F. M. CASTO, Chairman.



NATIONAL SOCIETIES, 1920.

August.

23-24-25-26-27—National Dental Association, Boston.

23-24—National Association of Dental Examiners, Boston.

23—American Dental Library and Museum Association, Boston.

STATE SOCIETIES.

May.

Massachusetts, Boston.
17-18-19-20-21-22—Nebraska, Lincoln.
17-18-19-20—Indiana, Indianapolis.
24-28—Montana, Great Falls.
27-29—Tennessee, Chattanooga.

June.

Maryland, Baltimore.
New Hampshire, Manchester.
New Mexico, Albuquerque.
Utah, Provo.
23-25—Maine, Old Orchard.
21-30—Southern California, Los Angeles.
15-16-17—South Carolina, Columbia.
9-10-11—Georgia, Atlanta.
14—Colorado, Colorado Springs.
14-15—Wyoming, Cheyenne
15-17—Florida, Miami.
22-25—North Carolina, Wrightsville Beach.
28-July 3—Idaho, Pocatello.
30-July 3—Virginia, Lynchburg.

July.

14-16—New Jersey, Atlantic City.
13-14-15—Wisconsin, Milwaukee.

November.

18—District of Columbia, George Washington University, Washington, D. C.
Arizona, Phoenix.

December.

2-3-4—Ohio, Columbus.
10—Delaware, Wilmington.

Dates to Be Announced.

Arkansas, Little Rock.
California State.
Louisiana, New Orleans.
Oregon, Portland.
Washington, Tacoma.

MEETINGS STATE BOARDS OF DENTAL EXAMINERS.

Vermont—June 28-30, Montpelier; Harry F. Hamilton, Secy., Newport.

Wisconsin—June 21, Milwaukee; William Kettler, Secy., Milwaukee.

Indiana—June 14-20, Indianapolis; H. C. McKettrick, Indianapolis.

Minnesota, June, 18, Minneapolis; C. G. Gillan, Secy., Austin.

California—June 21, San Francisco; C. A. Herrick, Secy., San Francisco.

Nebraska—June 8-12, Lincoln; H. H. Antles, Secy., Lincoln.

Iowa—June 7, Iowa City, C. B. Miller, Secy., Des Moines.

Pennsylvania—June 23-26, Philadelphia-Pittsburgh; A. H. Reynolds, Secy., Philadelphia.

South Dakota—June 23-26, Sioux Falls; L. S. Spencer, Secy., Watertown.

Texas—June 7-11, Dallas, Harrison B. Core, Secy.

Mississippi—June 15, Jackson; B. J. Marshall, Secy., Marks.

North Carolina—June 19, Wilmington; F. L. Hunt, Secy., Asheville.

Maine—July 7-9, Augusta; Henry Gilman, Secy., Portland.

Montana—July 12, Helena, T. M. Hampton, Secretary, Helena.

Rhode Island—June 29-30, July 1, Providence, Ernest A. Carbonner, Sec'y., Providence.

Florida—June 11. Miami, R. P. Taylor, Secy., Jacksonville.

New Jersey—June 28-30, July 1-2, Trenton, J. C. Forsyth, Secy., Trenton.

Wyoming—June 28-30, Cheyenne, Peter Apple, Jr., Secy., Cheyenne.

Alabama—June 21, Birmingham, A. R. Parks, Secy., Montgomery.

Michigan—June 14-19, Ann Arbor, R. S. Sutherland, Secy., Owosso.

Colorado—June 1, Denver, R. C. Quick, Sec'y, Denver.

Massachusetts—June 14-18, Boston, Joseph M. Carriere, Secy., Fitchburg.

North Dakota—July 13, Fargo, W. E. Hocking, Secy., Devil's Lake.

Missouri—May 12-15, Kansas City, V. R. McCue, Secy., Cameron.

MASSACHUSETTS BOARD OF DENTAL EXAMINERS.

The Massachusetts Board of Dental Examiners will hold an examination for registration June 14 to 18 inclusive. The practical examination will be held at Harvard University Dental Department, Longwood Avenue, Boston, Mass., commencing Monday, June 14th. Applicants must file their applications at least ten days prior to above date. Full information and application blanks may be secured by addressing the secretary.

JOSEPH N. CARRIERE, D. D. S.,
Secretary, Massachusetts Board of Dental Examiners, 352 Main Street, Fitchburg, Mass.

MONTANA STATE DENTAL SOCIETY.

The 17th annual meeting of the Montana State Dental Society will be held in Great Falls, May 24, 25, 26, 27, 28 and 29. This meeting will be run on the post-graduate system and the following men have been engaged to conduct the work: Dr. Rupert E. Hall, Chicago; Dr. F. E. Roach, Chicago, and Dr. Brickers, of Rochester, Minn. An invitation is extended to all ethical practitioners.

J. E. BAKER, Secretary,
311 Ford Bldg.,
Great Falls, Montana.

THE NEW JERSEY STATE DENTAL SOCIETY.

The annual meeting of the New Jersey State Dental Society will be a celebration of its 50th anniversary. It will be held on Young's Million Dollar Pier, Atlantic City, New Jersey, on July 14-15-16, 1920. The presence of men of National reputations will make it a memorable gathering.

Dr. W. W. Hodges, Chairman of the Essay Committee, announces that Dr. Edward C. Kirk, of Philadelphia; Dr. Otto U. King, Secretary of the National Dental Associatian; Dr. John V. Conzett, of Dubuque, Iowa, President of the National Dental Association; Dr. Thomas B. Hartzell, of Minneapolis, and Dr. Wayne Babcock, of Philadelphia, will present able papers.

Dr. Frank L. Manning, Chairman of the Clinic Committee, has arranged for study classes to be conducted by Dr. John V. Conzett, on Inlays; Dr. Thomas B. Hartzell, on Pyorrhea and Prophylaxis, and Dr. Frederick Ream, on the X-ray. In addition, general clinics will be given by men from the Component Societies, and by Clinical clubs.

Dr. Albert Kerr, Chairman of the Exhibit Committee, is planning for the greatest display of dental goods and preparations ever shown at a dental con-

vention. The exhibit alone will be worth visiting and in conjunction with the other features, will make the meeting the best in the history of the society.

All ethical practitioners are cordially invited to attend. For a list of hotels or other information, address,

F. K. HEAZELTON, Secretary,
223 East Hanover St.,
Trenton, New Jersey.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The annual convention of tht Southern California Dental Association will be held in Los Angeles, June 21-30, 1920.

BERT BOYD, Secretary,
1010 W. P. Story Bldg.,
Los Angeles, Cal.

WISCONSIN STATE DENTAL SOCIETY.

The 50th annual (Golden Jubilee) meeting of the Wisconsin State Dental Society will be held at Milwaukee, Wisconsin, July 13th, 14th and 15th, 1920.

DR. W. F. FAUST, Secretary,
308 North Ave., Milwaukee, Wis.

SOUTH CAROLINA STATE DENTAL ASSOCIATION.

The annual meeting of the South Carolina State Dental Association will be held in Columbia, S. C., Jefferson Hotel, June 15, 16, 17, 1920.

ERNEST C. DYE, Secretary,
Greenville, S. C.

MAINE DENTAL SOCIETY.

The annual meeting of the Maine Dental Society will be held at Old Orchard, Maine, on June 23, 24 and 25, 1920.

B. C. GRAFFAM, Secretary,
Portland, Maine

MONTANA STATE BOARD OF DENTAL EXAMINERS.

The Montana State Board of Dental Examiners will hold their regular examinations at Helena, Montana, July 12, 1920. Applications should be in the hands of the Secretary at least ten days before the examinations.

T. M. HAMPTON, Secy.,
Helena, Montana.

FLORIDA STATE BOARD OF DENTAL EXAMINERS.

There will be a meeting of the Florida State Board of Dental Examiners, June 11, 1920, at Miami, Fla., for the purpose of examining all qualified applicants, who may come before them at that time. All applications should be in two weeks prior to the examination.

For further information, address

DR. R. P. TAYLOR,
414-415 St. James Bldg.,
Jacksonville, Fla.

MICHIGAN STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the Michigan State Dental Board for examinations will be held at Dental College, Ann Arbor, Michigan, June 14, 15, 16, 17, 18 and 19, 1920. Any one interested please communicate with the secretary.

B. S. SUTHERLAND, Secy-Treas.,
Owosso, Mich.

NORTH DAKOTA STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the North Dakota State Board of Dental Examiners will be held at Fargo, beginning the second Tuesday in July.

For application blanks and further information address,

W. E. HOCKING, Secretary,
Devil's Lake, N. Dak.

COLORADO STATE DENTAL BOARD.

The Colorado State Board of Dental Examiners will meet for the purpose of examining candidates for license to practice in Colorado, at Denver, Colorado, at the State House, beginning June 1, 1920, 8 A. M.

For further information and application blanks address,

R. C. QUICK, Sec'y.,
310 Metropolitan, Bldg.,
Denver, Colorado.

THE BOARD OF DENTAL EXAMINERS OF ALABAMA.

The Board of Dental Examiners of Alabama will conduct an examination for certificates to practice dentistry and dental hygiene (for women) at the Birmingham Dental College, Birmingham, Ala., Monday, June 21st at 9 A. M.

Properly filled application blanks must be in the hands of the Secretary not later than June 7th.

A. K. PARKS, Secy-Treas.,
412-14 First National Bank Bldg.,
Montgomery, Ala.

THE BOARD OF DENTAL EXAMINERS OF ALABAMA.

Montgomery, Ala., March 27, 1920.

To Whom It May Concern:

This appeal is directed by the State Board of Dental Examiners of Alabama to the recognized dental colleges of the United States.

In the light of present day knowledge, it seems to us but little short of criminal that the schools in many instances are graduating men with such a vague idea of the awful effect of Focal Infection resulting from improper root-canal technic.

So much secondary disease originating from focal infection makes it absolutely necessary that if root-canal technic is to be taught at all, then the most approved, modern methods should be taught, not only in lectures, but should be practiced rigidly in the infirmary.

In this connection, it is deplorable that in many instances we find recent graduates going out mentally equipped to practice obsolete methods and we respectfully suggest that these colleges which have not already done so, will establish a chair bearing the same relation to dental surgery that the chair of current literature bears to the academy course in the various colleges and universities.

With no intent to embarrass and with only the good of the public and the rightful recognition of the profession in mind, this appeal is respectfully submitted.

DR. C. W. LOKEY,
DR. H. T. McKINNON,
Committee, Board of Dental Examiners of Alabama.

BOARD OF DENTAL EXAMINERS STATE OF WYOMING.

Dear Sir: The laws regulating the practice of dentistry in Wyoming and the rules of the Board are essentially as follows:

An examination is required of all applicants and only holders of diplomas from reputable dental colleges are eligible to such examination. The Board does not interchange with other states, nor issue any temporary permits.

The written examination consists of Anatomy, Physiology, Histology and Bacteriology, Chemistry and Metallurgy, Oral Surgery, Anesthetics, Operative and Prosthetic Dentistry, Materia Medica and Therapeutics, Prophylactics and Orthodontia.

Applicants must present a full plaster model of upper and lower with teeth, also one without teeth. Practical work will be required from all candidates taking the examination. The candidate is required to furnish his own operating instruments, dental engine, amalgam, gold, wax and modeling compound.

The next meeting of the Board will be

held at Cheyenne, Wyoming, on the 28th to 30th days of June, 1920.

For further information and application blanks, address

PETER APPEL, JR., Secretary,
P. O. Box 643, Cheyenne, Wyoming.
Office: Rooms 305-306 Hynds Bldg.

MISSOURI DENTAL BOARD.

The Missouri Dental Board will hold its regular meeting for examining applicants at the Kansas City Western Dental College, Kansas City, Wednesday, Thursday, Friday, Saturday, May 12th, 13th, 14th, 15th.

V. R. McCue, Secretary,
Cameron, Mo.

NEW JERSEY BOARD OF REGISTRATION.

The State Board of Registration and Examination in Dentistry of New Jersey will hold their regular examination in the Second Regiment Armory, Trenton, N. J., June 28-29-30, July 1-2, 1920. License fee, $25.00; re-examination fee, $10.00.

Practical tests required: Insertion of an approximal gold filling with the approximating tooth in position, compound approximal amalgam filling, and a silicate filling. Candidate must furnish his own patient. Taking of impression, bite, selection of teeth, articulation, trial plate. Candidate must furnish his own patient. Practical examination in mouth diagnosis.

Attention is directed to the following quotation from the dental law of New Jersey: "Applicant shall present to said board a certificate from the commissioner of education of this state, showing that before entering a dental college he or she had obtained an academic education consisting of a four-year course of study, or the equivalent thereof." In accordance with this law the secretary will issue application blanks only upon presentation of the required certificate from the Commissioner of Education, State House, Trenton, N. J.

Applications must be filed complete ten days before the date of the examinations. Address all communications for further particulars to

JOHN C. FORSYTH, Sec'y.,
429 E. State St., Trenton, N. J.

RHODE ISLAND BOARD OF REGISTRATION.

The regular semi-annual meeting of the Rhode Island Board of registration in Dentistry for the examination of candidates will be held in the State House, Providence, R. I., June 29th, 30th, July 1st, 1920.

All applications with the proper fee must be filed one week previous.

For further information address

ERNEST A. CHARBONNEL,
334 Westminster St., Providence, R. I.

STATE OF IDAHO DEPARTMENT OF LAW ENFORCEMENT.

The next regular examination for the dentists will take place in the Capitol Building, Boise, Idaho, on July 13, 1920. The examination will extend over a period of four days.

You have been informed of the changes in the administrative features of the Idaho Dental Law, whereby this department assumes those duties with the assistance of the Dental Committee or Board, consisting of five dentists, the department handling the administrative features while the committee handles the professional features, such as, conducting of examinations, granting of reciprocal licenses, adoption of educational requirements, etc.

All inquiries should be addressed to the Department of Law Enforcement, Boise, Idaho.

PAUL DAVIS, Director,
Bureau of License.

CONNECTICUT DENTAL HYGIENISTS.

The annual meeting of the Connecticut Dental Hygienists Association will be held in Bridgeport, May 21st and 22nd at the Stratfield Hotel. A program of unusual interest has been planned. All ethical dentists and dental hygienists are invited.

COMMENCEMENT NOTICE.

The Dental Department of the University of West Tennessee, Memphis, will hold its commencement exercises in the College Hall, Monday, May the 10th. The principal address will be delivered by E. Clippinger, A. M., LL. D., Principal of LeMoyne Institute.

The Degrees will be conferred by M. V. Lynk, M. S., M. D., LL. D., President.

The following constitutes the class:

Augustus Rivers, Aurelius Jefferson, Warren Waters, Hezekiah Milloy, Eugine Sims, Jessie Warr.

AMERICAN DENTAL LIBRARY AND MUSEUM ASSOCIATION.

The next annual meeting of the American Dental Library and Museum Association will be held August 23rd, 1920, 3:30 P. M., at the Forsyth Dental Infirmary, Boston, Mass.

The list of applicants for membership in the Association have exceeded our expectations and we trust that all those interested in dental libraries and museums will forward their applications as soon as possible.

We expect to hold several sessions in Boston. At one of these will be discussions and papers that will be of interest to librarians, historians and curators.

The objects of the association are the creating and fostering of dental libraries and museums, and the maintenance of a system for exchange of dental literature, reprints, etc., as well as gathering material for museums. Securing and distributing the transactions of all dental societies.

Membership: Any dental society, association, university, college or library, having a permanent home and a dental library. Any individual interested in dental literature or libraries.

Benefits: The banding together of a united body with a common cause. The betterment of conditions in dental libraries. A clearing house thru which books, journals, reprints, or lists of these, may be sent from one library to another.

We desire to know what libraries now exist and how many would be interested in the association.

Application blanks will be forwarded upon request.

B. W. WEINBERGER,
Secretary-Treasurer,
40 East 41 Street, New York City.

NOTICE TO NORTHWESTERN UNIVERSITY DENTAL SCHOOL.

Our next regular Home-Coming Clinic will be a two-day meeting June 14 and 15. Clinics and lectures on some of our most important present-day professional problems will be given by men of ability and reputation. The program will be full and profitable. In addition we are to have a splendid banquet at which some interesting announcements for the university will be featured. We extend an earnest appeal to every alumnus to attend the entire session.

JAMES L. MORLAN, Secy.,
1431-25 E. Washington, St., Chicago.

TENNESSEE STATE DENTAL ASSOCIATION.

The 53rd annual meeting of the Tennessee State Dental Association will be held May 27, 28 and 29, 1920, at Chattanooga, Tenn.

OLIVER J. O'NEAL,
Chairman Publicity Committee,
Chattanooga, Tenn.

HOTEL RESERVATIONS

FOR THE

24th Annual Meeting, Boston, August 23-27,

SHOULD BE MADE AT ONCE.

Do not write to hotels as arrangements have been made to make all reservations thru the committee.

On the following pages will be found a list of hotels, types and prices of rooms and application blank.

Read carefully the instructions, and to avoid unnecessary confusion and delay, mail application at once.

Reservations will be made in the order in which applications are received.

The committee will endeavor to make reservation as requested, and will send a card, signed by the hotel, confirming completed reservation.

There will be no Headquarters Hotel. Headquarters will be in Mechanics' Building, the place of meeting.

Owing to the scarcity of rooms members are urgently requested to club together and share the many desirable suites listed. If willing to share suite or room with others please check where indicated on application. By so doing you will greatly assist the committee.

With the cooperation of everyone the Committee will be able to secure accommodations for all members attending.

INSTRUCTIONS.

Select type of accommodations desired. (See Types of Hotel Reservations on next page.)

Fill in Application for Hotel Reservation. Be sure to mention type, note (if any), price, three choices of hotels, if you will share room or suite with others, time of arrival.

Sign application, giving name and address in full. Mail at once to address given.

TYPES OF HOTEL RESERVATIONS.

Important—The word "inside" indicates accommodations are located on courts. Variations from the usual types of suites and rooms are explained in notes at the bottom of this page. To secure the best accommodations members are advised to club together and use the many desirable suites listed. (See next page.)

Type A

Suite of Parlor and 2 Bedrooms, for 4 persons, private bath for the suite, 2 single beds in 1 room, double bed in other room.

Type B

Suite of 2 Bedrooms, for 4 persons, bathroom between bedrooms, 1 room with 2 single beds, other room with double bed.

Type C

Suite of Parlor and Bedroom, for 2 persons, private bath, 2 single beds.

Type D

Double (outside) Bedroom, for 2 persons, private bath, 2 single beds.

Type E

Double (outside) Bedroom, for 2 persons, private bath, 1 double bed.

Type F

Double (inside) Bedroom, for 2 persons, private bath, 1 double bed.

Type G

Single (outside) Bedroom, for 1 person, private bath, single bed.

Type H

Single (inside) Bedroom, for 1 person, private bath, single bed.

Type J

Single room, for 1 person, without attached bath, single bed.

Type K

Double Bedroom, for 2 persons, without attached bath, double bed.

EXPLANATORY NOTES.

1. Bathroom not between bedrooms, suitable for men only.
2. Has all single beds, no double beds.
3. With bed in parlor accommodates 3 persons at $7, $8, $9, $10.
4. Same type for 3 persons at $8, $9.
5. Same type for 4 persons at $6.
6. Same type, with 2 baths, $18.50.
7. Has all double beds, no single beds.

IN EVERY CASE THE FIGURES INDICATE THE RATE PER DAY, FOR EACH SUITE OR ROOM.

HOTELS	A	B	C	D	E	F	G	H	J	K
Adams House	$	$ 9.50 Note 1 Note 7	$ 8.00	$	$	$ 3.50	$	$	$ 2.00 2.50	$ 3.50
Hotel Arlington		6.00 6.50 Note 7	6.00 Note 7	4.00 5.00	3.50 4.00		3.00 3.50			
Hotel Avery		12.00		7.00	6.00					
Hotel Bellevue		11.00 13.00		7.00 8.00 10.00	5.00 6.00 7.00			4.00 5.00	2.50 3.00	4.00 5.00 6.00
Hotel Brewster		10.00 Note 7		4.50	4.00		2.50		2.00	3.00
Hotel Buckminister	15.00 Note 2	10.00 Note 2	9.00	7.00					2.50	4.00 Note 2
Hotel Colonial		6.00 Note 7	5.00 Note 7		3.00 3.50				1.50	2.00
Hotel Commonwealth		8.00 Note 7			4.50 5.00 6.00		3.00 4.00		2.50 3.50	3.50 4.50
Hotel Essex					7.00	7.00	4.00	4.00	3.00	5.00
Hotel Fritz-Carleton	9.00 10.00 Note 4		6.00 7.00 8.00 9.00 Note 3		5.00		4.00		2.50 3.00 3.50	3.50 4.00 4.50
Garrison Hall	12.00 Note 7	10.00 Note 7	5.00 Note 7		5.00	4.00	3.00			
Hotel Harvard	12.00	10.00	5.00 Note 7							
Hotel Langham	7.00	7.00 Note 7	4.50 Note 7		3.50				1.50	2.50
New American House			10.00	5.00	5.00					3.00 4.00 Note 5
Parker House	17.00 Note 6		12.00 Note 7	7.00	5.50 6.50 7.00		3.50 4.50 5.00		2.50 3.00 3.50	3.50 4.00 4.50
Hotel Puritan	16.00		10.00	6.00		5.00		4.00		
Hotel Putnam									1.00 1.50 2.00 3.00	2.00 3.00
Quincy House					7.00	6.00			3.00	4.00
United States Hotel			5.50	4.50 5.00	5.50	4.50 5.00			2.00	3.00 4.00 4.50
Young's Hotel				7.00	6.50		4.50			4.00

Fill in Application below, sign, tear out and mail at once to
COMMITTEE ON HOTEL RESERVATIONS,
National Dental Association, 419 Boylston Street,
Boston, Mass.

(Tear on this line.)

(Tear on this line.) (Tear on this line.)

APPLICATION FOR HOTEL RESERVATION.

Please reserve for me Hotel Accommodations, European plan, as follows:

A suite of type.....as modified by note.....at $.....per day.

A room of type.....as modified by note.....at $.....per day.

My choice of hotels is: 1st.....2nd.....3rd .....

I would (not) be willing to share room or suite with other members.

My party will consist of the following persons:

.....

.....

.....

Should I be unable to occupy the reservation and fail to notify you or the hotel at least ten (10) hours before the time for which the reservation is made, I agree to pay for one day's entertainment, in the event the charge is made by the hotel.

Will arrive at hotel Name .....

....., ..., Aug..... Street .....

Day Time Date City ....., State.....

IDAHO STATE DENTAL ASSOCIATION.

The next meeting of the Idaho State Dental Association will be held in Pocatello, June 28 to July 3.

The meeting will be conducted on the post-graduate plan. The services of Drs. F. Ewing Roach and Arthur E. Smith, of Chicago, have been secured. Other teachers may be secured.

M. J. GOODE, Secretary,
Filer, Idaho.

FLORIDA STATE DENTAL SOCIETY.

The annual meeting of the Florida State Dental Society will be held in Miami, Florida, June 15, 16, 17, 1920.

H. B. PATTISHALL,
Corresponding Secretary,
332 St. James Bldg., Jacksonville, Fla.

NORTHERN OHIO DENTAL ASSOCIATION.

The Northern Ohio Dental Association will meet at the Hotel Statler, Cleveland, June 7th, 8th and 9th. Post-graduate courses will follow on the 10th and 11th.

GEORGE B. SMITH, Secretary,
Fremont, Ohio.

VIRGINIA STATE DENTAL ASSOCIATION.

The fifty-first annual meeting of the Virginia State Dental Association will be held at Virginian Hotel, Lynchburg, Virginia, June 30th to July 3rd.

HARRY BEAR, Secretary,
410 Professional Bldg., Richmond, Va.

NORTH CAROLINA DENTAL SOCIETY

The forty-sixth annual meeting of the North Carolina Dental Society will be held in Wrightsville Beach, N. C., June 22, 23, 24 and 25.

H. L. KEITH, Secretary,
Hendersonville, N. C.

CANADIAN DENTAL ASSOCIATION.

The Canadian Dental Association will hold its tenth biennial meeting in Ottawa, Canada, August 17th, 18th, 19th, and 20th, 1920.

SYDNEY W. BRADLEY, Sec'y,
206 Laurie Ave. W., Ottawa, Canada.

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Dental text books, old or new; Dental Journals, College year books, College announcements, State Board Dental Reports, State Dental Society bulletins and programmes, State Board reports, Photographs, Engravings or Prints of Dentists, any print or picture relating to the practice of dentistry.

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